Marion & Co.'s Plates

BROMIDE OPALS for Enlargements and direct contact printing. We strongly recommend photographers to take up the direct printing, the results with our plates are beautiful, and the public like them. They can be framed up in plush very cheaply. The development with Eikonogen is a very simple and clean way. Customers when ordering should always ask for instructions for development. Price of Plates:— $4\frac{1}{4}\times3\frac{1}{4}$, 3/6; $6\frac{1}{2}\times4\frac{3}{4}$, 7/6; $8\frac{1}{2}\times6\frac{1}{2}$, 13/-; 10×8, 16/-; 12×10, 26/-; 15×12, 40/- per doz. Plush Frames, No. 32, for ditto, $\frac{1}{2}$-plate, 2/-; $\frac{1}{1}$-plate, 2/9 10×8, 3/6; 12×10, 4/10; 15×12, 6/- each.

For Enlargements up to 12×10 there is a very cheap Enlarging Camera, Griffith's, price, complete with Lens, 30/-; packing, 2/6 extra. Those who wish to go in for the work thoroughly, and have the means of using a Dark Room so that they can make all sizes, should supply themselves with a Lantern, complete with Triple Wick Lamp, a pair of Condensers, $8\frac{1}{4}$ins., and a Portrait Lens, price complete £10 5s. The $\frac{1}{2}$-plate Negatives come well in the size of the Condenser. Both these instruments can be used either for Opal or Paper.

COWAN'S CHLORIDE AND CHLORO-BROMIDE PLATES. Specially prepared for making Lantern Plates, Transparencies, and reproduced Negatives. The Chloride is the slower plate, and can be developed into almost any colour. The Chloro-bromide is a more rapid plate, and can be printed by artificial light. We publish a little book of revised formulæ for this class of work; it will be supplied free on application. For use with these plates we call attention to Griffith's Lantern Camera, prices complete with Lens, $\frac{1}{2}$-plate, 12/6; oblong, 14/6; $\frac{1}{1}$-plate, 15/-; 12×10, adjustable to any size, 21/-. Also Cowan's Lantern Slide Printing Frame, 12/6. Prices of above Plates, $3\frac{1}{4}$, 1/-; $\frac{1}{4}$-plate, 1/-; 5×4, 1/5; $6\frac{3}{4}\times3\frac{1}{4}$, 2/2; $\frac{1}{2}$-plate, 2/3; $8\frac{1}{2}\times6\frac{1}{2}$, 4/3; 10×8, 7/3; 12×10, 10/-; 15×12, 18/- per doz.

COWAN'S ORGANIC CHLORIDE PLATES. Red Label. These are printed in contact, and are printed and toned like ordinary Sensitised Paper. Beautiful results are obtainable, and Charming Opal pictures can be got with as little trouble as with ordinary Albumenized Paper. The Plate, however, is liable to become discoloured; it ought to be protected from air and damp, and used very soon after it is coated. Present prices are, $\frac{1}{4}$-plate, 4/-; $\frac{1}{2}$-plate, 8/-; $\frac{1}{1}$-plate, 13/6; 10×8, 16/6; 12×10, 27/-; 15×12, 42/-, in boxes of half-doz.

[*See preceding and following pages.*

22 & 23, SOHO SQUARE, LONDON, W.

MARION'S MOUNTS

(Made at their Factory, Courbevoie, near Paris)

EXCEL IN QUALITY AND FINISH.

Novel Styles of Make.

Novel Tints for all sorts of Printing Processes.

Bevels of real Gold Leaf.

Bevels Plain.

Blocking Blind.

Blocking Gold Leaf.

New and Elegant Patterns for Backs.

New Tints in Printing Inks.

All Finished in the fine French manner.

Excelling all other makes.

SAMPLES.—A full set to Professional Photographers sent free to any part of the world.

22 & 23, SOHO SQUARE, LONDON, W.

MARION'S

"Perfection" Camera.

HIGHLY FINISHED & OF THE BEST QUALITY MAHOGANY.

A very strong and yet very light Camera. A very short focus, with no bottom board projecting; yet it has a very long focus when racked out. Rising and swing front, double swing back. Patent turntable for fixing stand to. Every desirable movement has been provided for in the most practical way.

PRICES (COMPLETE).

With Three Double Backs, and with Folding Ash Tripod.

For plates	$6\frac{1}{2} \times 4\frac{3}{4}$	..	£8	5	0	For plates	10×8	..	£12	5	0
,,	$8\frac{1}{2} \times 6\frac{1}{2}$	..	9	15	0	,,	12×10	..	14	10	0

For plates 15×12 .. .. £18 5 6

A CHOICE OF LENSES FOR THE ABOVE.

	Soho.	Voigtländer's Medium Rapid Euryscope.	M. & Co.'s Wide-angle.
For plates $6\frac{1}{2} \times 4\frac{3}{4}$	63/-	92/-	60/-
,, $8\frac{1}{2} \times 6\frac{1}{2}$	78/-	123/-	80/-
,, 10×8	102/-	145/-	100/-
,, 12×10	140/-	176/-	140/-
,, 15×12	200/-	204/-	200/-

The New Camera.

For plates $6\frac{1}{2} \times 4\frac{3}{4}$ (cabinet size).

Price for Camera, with one Double Back and Tripod 75/-
Extra Double Backs .. .. 10/- each.

The United Rectilinear Lens for above, 21/- The Soho, 63/-
M. & Co.'s Wide-angle, 60/-

The New Half-plate Complete Outfit, with all apparatus and material necessary for producing perfect negatives and good printing.

Price £7.

This is really a good camera, and well worth the money.
Larger sizes in course of preparation.

22 & 23, SOHO SQUARE, LONDON, W.

EIKONOGEN.—This has come to be acknowledged as the best and most powerful of all developers, and for amateurs there is this advantage—it can be used without any soiling of the hands. It is sold as follows:—Eikonogen Cartridges only require the addition of water, when it is ready for use, 10 Cartridges in a box, 3/- Very convenient for travellers. In powder, for mixing with Sulphite of Sodium and Carbonate of Soda, according to formula:—1oz. tin, 1/2; $\frac{1}{20}$ of kilo., 1/9; $\frac{1}{10}$ of kilo., 3/-; $\frac{1}{4}$ kilo., 6/6; $\frac{1}{2}$ kilo., 12/6.

KERSHAW'S NEW TIME AND INSTANTANEOUS SHUTTERS.—The original Shutter of Kershaw is well known as being one of the very best Instantaneous Shutters in the market—the only thing wanted to make it a perfect shutter was an arrangement for time exposures. This has now been achieved, and we can safely recommend this New Shutter as one of the best all-round Shutters. Prices for Hood of Lenses:—1$\frac{1}{2}$in. and under, 20/-; 1$\frac{3}{4}$in., 21/-; 2in., 22/-; and other sizes in proportion.

THE "A.J." BURNISHER (Sole Agents for Great Britain and the Colonies).—We have no hesitation in recommending this as giving the finest Enamelled results with the least trouble and danger of damaging the prints or mounts. The exact pressure can be set for different thickness of mounts. The Burnishing Bar can be easily removed without interference with the remainder of machine. Can be used with either gas or spirit. Full list of particulars on application.

THE GLENFIELD PHOTO STARCH.—A special Starch for Photographic Mounting, specially pure. Is being used by most of the leading photographers. In bags of 7, 14, 28 and 56lbs, Price 8d. per lb.

SLINGSBY'S FLASH-LIGHT APPARATUS, worked out in a practical manner, so that success is certain for those who follow the directions. Stand, with four lamps, connecting tubing and pneumatic ball, complete, £4; ditto, with eight lamps, reflectors, connecting tubing and pneumatic ball, £8. Both packed in cases for carrying about. Ditto, large overhead gear, with twelve lamps, long rubber tubing, powerful discharging bellows, £10. This set is suitable for photographing scenes in a theatre, or a public assembly, or a ball. We must urge on purchasers to buy Slingsby's Book, in which his system is fully explained. Price of the Book, 4/- A discount on the Flash-light Sets is allowed to the Trade. Mr. Slingsby has just introduced a Stand with large size and top screen, so as to screen the lens from the light of the lamps, Price 35/-

Full Catalogue sent free on application.

22 & 23, SOHO SQUARE, LONDON, W.

A LIST OF ALL

HAND CAMERAS MADE OR SOLD BY MARION & CO.

	£	s.	d.
The Puck Camera and Lens, with 1 plate ready for exposure	0	1	8
The Puck Developing Set, Printing Set, and Camera and Lens, all complete, with Instructions	0	7	4
The Miniature Landscape Camera, in polished mahogany, leather bellows, and Lens	1	1	0
The Book Camera, Dr. Krugener's, with 24 sheaths, for plates $1\frac{5}{8}$in. square, with a Book of Instructions	2	5	0
The Book Camera, Dr. Krugener's, with 30 sheaths, for plates $3\frac{1}{4}$in. square	7	10	0
Marion's Metal Miniature Hand Camera, with Lens and one Back, for plates $1\frac{1}{4}$in. square...	1	5	0
Marion's Metal Miniature Hand Camera, with Lens and one Back, for plates 2in. square	2	5	0
Marion's Metal Miniature Hand Camera, with Lens and one Back, for plates $3\frac{1}{4}$in. square...	4	4	0
Marion's Metal Miniature Hand C mera, with Lens and one Back, for plates $4\frac{1}{4}\times3\frac{1}{4}$in. square	5	5	0
Marion's Metal Miniature Hand Camera, with Lens and one Back, for plates $6\frac{1}{2}\times4\frac{3}{4}$in square	6	6	0
Marion's Parcel Camera, new make, with Indiarubber Bag Plate-holder, $\frac{1}{4}$-plate	4	0	0
Ditto ditto ditto if covered in leather	4	14	0
The Delta, for plates $3\frac{1}{2}\times4\frac{3}{4}$ (9 c. × 12 c.), for 12 plates, with good Lens	3	3	0
The Delta, for plates $5\frac{1}{8}\times7\frac{1}{16}$ (13 c. × 18 c.), for 12 plates, with good Lens	5	5	0
The Delta, for Stereoscopic plates, $3\frac{1}{2}\times7$ (9c. × 18 c.), for 12 plates, with good Lens	5	5	0
The Normal Simplex, for plates $3\frac{1}{2}\times4\frac{3}{4}$ (9 c. × 12 c.), for 12 plates	8	8	0
The Normal Simplex, for plates $5\frac{1}{8}\times7\frac{1}{16}$ (13 c. × 18 c.) for 12 plates	14	3	0
The Normal Simplex, for Stereoscopic plates $3\frac{1}{2}\times7\frac{1}{16}$ (9 c. × 18 c.), for 12 plates	14	14	0
The Radial, for 12 plates, $3\frac{1}{4}$ square	6	0	0
Ditto ditto $4\frac{1}{4}\times3\frac{1}{4}$	7	10	0
Ditto ditto $6\frac{1}{2}\times4\frac{3}{4}$	12	0	0
The Beaumont, for 12 plates, $3\frac{1}{4}\times3\frac{1}{4}$, in preparation.			
Ditto ditto $4\frac{1}{4}\times3\frac{1}{4}$ ditto			

22 & 23, SOHO SQUARE, LONDON, W

PHOTOGRAPHIC LITERATURE.

The book-post prices cover the postage to any part of the world.

ENGLISH MAGAZINES.

The Practical Photographer. Monthly, 1d. 24 pages, full of illustrations. Double numbers (April, August, and December), 2d. Annual subscription, post-free, 2s. 9d.

The Photographic Quarterly. The most *recherché* periodical devoted to photography. Quarterly, 2s., post-free.

The Photographic Review of Reviews. Monthly (15th of month). Price 6d. Post-free, six months, 3s. 6d.; per annum, 6s.

The British Journal of Photography. Weekly, price 2d.; post-free 2½d.

The Photographic News. Weekly, price 2d.; post-free 2½d.

The Amateur Photographer. Weekly, price 2d; post-free, 2½d.

Photography. Weekly, price 1d.; post-free 1½d.

Photographic Work. Weekly, price 1d.; post-free 1½d.

The Magic Lantern Journal. Monthly, 1d. (November double number, 2d.) Post-free, per annum, 1s. 6d.

ELEMENTARY HANDBOOKS.

The Amateur's First Handbook of Photography. A complete guide and instructor in the art of modern photography. The sixth edition contains much additional matter, frontispiece, and many illustrations. 84 pages. 6th edition. 14th to 19th thousand. Price 6d., post-free 7d.

Photography for All. By W. Jerome Harrison, F.G.S. Illustrated, 112 pages. Price 1s., post-free 1s. 2d.

Photography in a Nutshell. By "The Kernel" Crown 8vo. 120 pages, frontispiece, 3 plates, and smaller illustrations. Paper covers. Price 1s., post-free, 1s. 2d. Cloth 2s. 6d., post-free 2s. 10d.

Practical Guide to Photography. Price 2s. 6d., post-free 2s. 9½d.

Experimental Photography. By Clement J. Leaper, F.C.S. 102 pages, stiff boards, 1s.; cloth 1s. 3d. Post-free 1s. 2d. and 1s 5d.

Manual, Principles and Practice of Wet Plate and Dry Plate Photography. By Jabez Hughes. One of the oldest photographic handbooks, and specially useful to those who wish to try wet plate work. The dry plate portion is up to date. 104 pages, paper covers, price 1s.

Photography for Amateurs. By T. C. Hepworth, F.C.S. 186 pages, illustrated. With list of dark-rooms. Stiff paper 1s., cloth 1s. 6d. Post-free 1s. 2d. and 1s. 8d.

The Beginner's Guide to Photography. Cloth bound, illustrated, 108 pages. Price 6d., post-free 8d.

The Ilford Manual of Photography. By C. H. Bothamley. 212 pages. Fully illustrated. Bound cloth 1s.; post-free 1s. 3d.

Burton's Modern Photography. Tenth edition. 208 pages. Illustrated. Paper covers 1s.; post-free 1s. 2d.

ADVANCED HANDBOOKS.

Wilson's Quarter Century in Photography. By Edward L. Wilson, Ph. D., Editor of *Wilson's Photographic Magazine*. Undoubtedly the most complete photographic handbook ever published. Deals with all processes, both for amateur and professional workers. Includes instructions on studio building, and the arrangement of blinds, shades, backgrounds, and accessories; and deals with the art department of photography as thoroughly as it does with the scientific side. Royal 8vo., 528 pages, with 386 illustrations. Price 17s. Parcels post, 17s. 6d.; book post, 17s. 11d.

Instruction in Photography. By Captain W. de W. Abney, F.R.S. Eighth edition, corrected to date. 388 pages, many diagrams and illustrations. Stiff paper covers, price 3s. 6d.; post-free 3s. 10d.

Photography with Emulsions. By Captain W. de W. Abney, F.R.S. Price 3s., post-free 3s. 3d.

Science and Practice of Photography. A complete manual, by Chapman Jones, F.C.S. Fully illustrated, crown 8vo. Price 2s. 6d., post-free 2s. 10½d. Cloth 3s. 6d., post-free 3s. 10½d.

The Photographic Negative. By the Rev. W. H. Burbank. A complete text book for beginners; with full page photo-process illustrations, and many excellent cuts in the text. 200 pages, cloth 6s. 6d. Parcels post 6s. 10½d., book post 6s. 11½d.

Processes of Pure Photography. By W. K. Burton and Andrew Pringle. Price 4s. 6d., post free 4s. 10½d.

The First Principles of Photography. By Clement J. Leaper, F.C.S. 270 pp. Illustrated. Cloth 5s. Post-free 5s. 3d.

HANDBOOKS ON SPECIAL BRANCHES.

Bromide Enlarging: How to do it. By A. R. Dresser. Price 6d., post-free 7d.

Practical Enlarging. By John A Hodges. 87 pp. Many diagrams. Stiff paper covers 1s.; post-free 1s. 2d.

Bromide Paper. Instructions for Contact Printing and Enlarging. By Dr. E. A. Just. Translated by Walter E. Woodbury and H. Snowden Ward. With bromide paper frontispiece and upwards of 30 illustrations in the text. Demy 8vo., 160 pages; price 1s., post-free 1s. 3d.

The Practical Ferrotyper. By H. Snowden Ward. A complete instruction book for the "wet" ferrotype process. Many illustrations, 52 pages; price 9d., post-free 10d.

Practical Photo-Micrography. By Andrew Pringle. Cloth, gilt lettered, illustrated; price 10s. 6d., post free 11s.

Photo-Micrography. By J. H. Jennings. With a chapter on preparing Bacteria, by Dr. R. L. Maddox. Price 3s., post-free 3s. 2d.

Collotype and Photo-Lithography. By Dr. Julius Schnauss. Translated by Dr. Schnauss and Edwin C. Middleton. With appendix on Steam Presses by E. C. Middleton. Price 5s., post-free 5s. 4½d.

Photo Mechanical Printing. By Prof. W. K. Burton. Price 4s., post-free 4s. 5d.

The Stereoscopic Manual. By W. I. Chadwick. Illustrated, cloth 1s., post-free 1s. 1d.

The Art and Practice of Interior Photography. By F. W. Mills. Illustrated, cloth, price 2s. 6d., post-free 2s. 9d.

The Art of Retouching Negatives, and Finishing and Colouring Photographs. By Robert Johnson. Large 8vo., 132 pages, with 11 plates; price 2s., post-free 2s. 3d., book post 2s. 3½d.

The Art of Retouching. By J. Hubert. Price 1s., post-free 1s. 2d.; cloth 1s. 3d., post-free 1s. 5d.

Enamelling and Retouching: a practical treatise, by P. Piquepe. Price 2s. 6d., post-free 2s. 8d.

Photographic Printers' Assistant. By William Heighway. Price 1s., post-free 1s. 1d.

Elementary Lessons in Silver Printing. By W. M. Ashman. Price 1s. 6d., post-free 1s. 8d.

The Art and Practice of Silver Printing. By H. P. Robinson and Captain Abney. Frontispiece and other illustrations, paper covers, 136 pages. Price 2s. 6d., post-free 2s. 8d.

Platinum Toning. By Lyonel Clark. 96 pages, stiff boards, 1s.; cloth 1s. 3d Post-free 1s. 2d. and 1s. 5d.

Flash-Light Photography. By Robert Slingsby. With full-page silver print illustrations. Price 4s., post-free 4s. 6½d.

Practical Portrait Photography. By William Heighway. Price 1s., post-free 1s. 1½d.

The Optics of Photography and Photographic Lenses. By J. Traill Taylor. 250 pages, many diagrams, bound cloth. Price 3s. 6d., post-free 3s. 10d.

Cameras, Lenses and Shutters. By various writers. Price 1s., cloth 1s. 3d. Post-free 1s. 2d. and 1s. 5d.

The A B C Guide to Autotype Permanent Photography. By J. R. Sawyer. 98 pages, with Autotype frontispiece and folding plate. Handsome cloth, gilt lettered, price 2s 6d., post-free 2s. 9d.

The Studio, and what to do in it. By H. P. Robinson. Cloth bound, gilt lettered, fully illustrated. 150 pages, price 2s. 6d., post-free 2s. 8d.

The Lighting in Photographic Studios. By P. C. Duchochois. ¼ cloth, 54 pages with diagrams; price 1s. 6d., post-free 1s. 7½d.

Development. By Lyonel Clark. 48 pages, with diagram and table of formulæ. Stiff cover, price 1s.; cloth 1s. 2d. Post-free 1s. 2d. and 1s. 5d.

Photography for Architects. By F. W. Mills. Demy 8vo., 124 pages, 3 plates and other illustrations. Cloth; price 2s. 6d., post-free 2s. 9d.

Photo-Engraving and Photo-Lithography. By W. T. Wilkinson. Price 5s., post-free 5s. 5d.

Photographic Reproduction Processes. By P. C. Duchochois. A treatise on photographic impressions without silver salts. Crown 8vo., cloth 3s. 6d., post-free 3s. 9d.

A Tourist's Equipment. By Rev. Precentor Mann, M.A. A useful pamphlet of instructions and hints to tourists. Price 6d., post-free 7d.

MAGIC LANTERN.

Book of the Lantern. By T. C. Hepworth, F.C.S. A new edition, 278 pages' illustrated, bevelled cloth. Price 3s., post-free 3s. 11d.

The Magic Lantern: Its Construction and Use. 82 pages, illustrated Cloth, 6d.; post-free 8d.

Lantern Slides, and How to Make Them. By A. R. Dresser. Paper covers, illustrated, 48 pages; price 6d., post-free 7d.

Magic Lanterns: How Made and how Used; with practical hints to unpractised Lecturers. By A. A. Wood, F.C.S. 136 pages, illustrated, paper covers; price 1s., post-free 1s. 2d.

The Optical Lantern, for Instruction and Amusement. By Andrew Pringle, F.R.M.S. Stiff boards, ¼ cloth, well illustrated, 108 pages; price 2s. 6d., post-free 2s. 10d.

Optical Lantern for Teaching. By C. H. Bothamley. Illustrated, paper covers, 48 pages; price 6d., post-free 7d.

HISTORICAL AND LITERARY.

Pictures in Black and White, or Photographers Photographed. By Geo. Mason. Racy reminiscences of the earlier photographers. 188 pages, several full-page and other illustrations, paper covers; price 1s., post-free 1s. 3d.

The Evolution of Photography. By J. Werge. With chronological record, and personal reminiscences extending over forty years. Illustrated; price 5s., post-free 5s. 4d.

A History of Photography. Written as a practical guide and an introduction to its latest developments, by W. Jerome Harrison, F.G.S., with an appendix by Dr. Maddox on the discovery of the Gelatino-Bromide precess. Second edition, Demy 8vo., 150 pages. Paper 1s. 6d., post-free 1s 8½d.; cloth 3s. 6d., post-free 3s. 9½d.

BUSINESS.

Photography as a Business. By H. P. Robinson. To the novice commencing business this practical manual is indispensable. It should also be in the hands of all who desire to improve their business and mature their resources. Twelve chapters, with frontispiece, 86 pages. Price 1s., post free 1s. 1½d.; cloth 1s. 6d. post-free 1s. 7½d.

PRINCIPAL CONTENTS.—Amateurs and the Profession—Qualifications, natural and acquired—the Education of a Professional Photographer—the Premises—the Studio—Purchasing a Business—Payments—Proofs—Re-sittings—Prices—Book-keeping—Storing Negatives—Advertising—Out-door Work—Home Portraiture—Old Negatives—Management of the Sitter—Retouching—Exhibiting—Selling the Business—Copyright—etc, etc.

THE ART SIDE OF PHOTOGRAPHY.

Art Photography. By H. P. Robinson. 60 pages, 6 full-page plates, and many other illustrations; price 1s., cloth 1s. 3d. Post-free 1s. 2d. and 1s. 5d.

Picture Making by Photography. By H. P. Robinson. 146 pages, frontispiece, and many illustrations. Cloth, price 2s. 6d., post-free 2s. 9d.

Pictorial Effect in Photography. Being hints on composition, and chiaro oscuro for photographers. By H. P. Robinson. With numerous illustrations, paper covers, 150 pages; price 2s. 6d., post-free 2s. 8d.

Letters on Landscape Photography. By H. P. Robinson. Several illustrations, paper covers, 68 pages; price 1s., post-free 1s. 1d.

BOOKS OF REFERENCE & YEAR BOOKS.

Materia Photographia. By Clement J. Leaper, F.C.S. A treatise on the manufacture, properties, and uses of the substances employed in photography. 263 pp. Illustrated. Cloth, 5s. Post-free 5s 3d.

The Encyclopædia of Photography. By Walter E. Woodbury. With over 1000 references and 200 explanatory diagrams and sketches. Complete in 12 parts. Price 6s., post-free 7s.

Dictionary of Photography. By E. J. Wall. New and revised edition; price 2s. 6d., post free 2s. 11d.

Evening Work. By T. C. Hepworth, F.C.S. Cloth 2s. 6d., post-free 2s. 9d.

Handbook of Photographic Terms. By William Heighway. Processes, formulæ, applications, etc., of photography; alphabetically arranged for reference. Price 2s. 6d., post-free 2s. 8d.

A Casket of Photographic Gems. By H. Inglis Rogers. A collection of 500 dodges, recipes, etc., Price 1s., post-free 1s. 2d.

Photographic Pastimes. By Hermann Schnauss. Crown 8vo., stiff paper covers. Over 200 pages. Abundantly illustrated. Price 1s. Post-free 1s. 1½d.

British Journal Almanac, years 1889, 1890, 1891, and 1892. Price 1s. each. Post-free 1s. 8d.

Photographic News Almanack, 1892, and some of the back issues. Price 1s. each. Post-free 1s 4½d.

Photography Annual. Profusely illustrated. It will be remembered that last year's Annual was sold out within a few days of publication, and at once went up to a premium. Price 2s. 6d. Cloth 3s. 6d. Post-free, by parcels post 3s. 1½d. and 4s. 1½d.; by book post 3s. 9d. and 4s. 9d.

Other English and American Year-Books as published.

EXPOSURES, TABLES, ETC.

The Pocket Exposure Note Book. Convenient size for the waistcoat pocket. Ruled and printed for nearly 300 exposures. Spaces are provided for No. of plate, date, subject, light, plate, lens, stop, hour, seconds, and remarks. Bound cloth. Price 3d. Post-free 3½d.

The Pocket Exposure Note Book. Superior edition. With pencil and pocket for memoranda. 6d. Post-free 6½d

The Amateur Photographer's Ready Reckoner. By Viæ. Handsomely cloth bound, with elastic band. Second edition. Contains most complete exposure tables, and ruled pages for recording exposures made. Price 1s. 6d. Post-free 1s. 7d.

Practical Index of Photographic Exposures. By A. R. Wormald. Price 1s. 6d. Post-free 1s. 7d.

Photographic Labels. Book containing over 100 printed, gummed, and perforated labels for all photographic chemicals and requisites. Price 6d. Post free 6½d.

Sir D. Salamon's Note Book. Price 1s. Post-free 1s. 1d.

Any of these publications can be obtained to order from ANY DEALER in PHOTO-MATERIALS for the published price; or at post-free prices from

PERCY LUND & CO.,

MEMORIAL HALL, LUDGATE CIRCUS, E.C.

THE COUNTRY PRESS, BRADFORD.

'OPTIMUS' PHOTOGRAPHIC COMPETITION. PRIZES, £105.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, **LONDON.**

ESTABLISHED 1852. CATALOGUE FREE.

Manufacture Lenses, Cameras, and Photographic Apparatus.

'OPTIMUS'

(TRADE MARK).

IRIS DIAPHRAGMS fitted to Rapid EURYSCOPE and Rapid RECTILINEAR.



5/4	7/5	9/7	10/8	12/10	15/12	18/16
10 -	11 -	12 6	14 -	16 -	18 -	20 - extra.

'OPTIMUS' Rapid EURYSCOPE.

The Aperture is F/6. The Lenses are of Special Optical Glass, constructed with the nicest precision of curvatures, so maintaining good marginal definition, coupled with the most extreme rapidity.

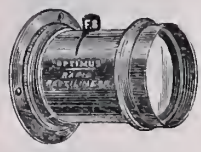
5 by 4	6 by 5	7 by 5	8 by 5	9 by 7	10 by 8	12 by 10
63 -	78 -	94 6	110 -	126 -	220 -	380 -



'OPTIMUS' Wide-angle EURYSCOPE.

F/9 50. This Aperture is exceedingly open for wide-angle work. The definition, however, is in no way sacrificed, as the curvatures are most perfectly accurate, and the minute detail in architectural and interior subjects is rendered with the maximum of crispness, and a total absence of distortion.

To cover	5 by 4	7 by 5	9 by 7	10 by 8	12 by 10
Price	63 -	94 6	126 -	220 -	380 -



'OPTIMUS' Rapid RECTILINEAR.

Aperture F/8. Second only to the above for rapidity, therefore well suited for instantaneous effects, out-door groups and views, as well as interiors; copying and enlarging are also within the capabilities of this lens—in fact, its work may be styled UNIVERSAL.

5/4	6/5	7/5	8/5	9/7	10/8	12/10	15/12	18/16
33 -	45 -	49 6	64 -	82 6	127 6	142 6	180 -	225 -

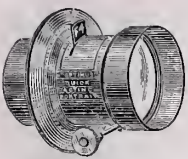


'OPTIMUS' Wide-angle SYMMETRICAL.

Aperture F/16. Specially adapted for Architecture.

Can be used to advantage when very close to the subject.

5/4	7/5	9/7	10/8	12/10	15/12	18/16
39 -	52 6	82 6	127 6	142 6	180 -	225 -



'OPTIMUS' Quick-acting PORTRAIT.

Aperture F/4. Specially constructed for short exposures in Portraiture They are second to none, definition being maintained by their perfect optical qualities.

4½in. focus,	Carte-de-visite,	1B,	diameter 2in.	... 90 -
5¾in. ,,	Cabinet,	2B,	,, 2¾in.	... 120 -
9in. ,,	Grand Cabinet	3B,	,, 3½in.	... 180 -

"'OPTIMUS RAPID EURYSCOPE.' With its full aperture of 1¾in. (its equivalent focus being 11in.), defines with EXTREME BRILLIANCY, and when used with a stop it easily covers a 10 by 8 plate to the corners, which is larger than that engraved on the mount at its possibility. Working as it does with such a LARGE APERTURE (F/6 approx.) it serves as a portrait and group lens, as well as a landscape and copying objective. There is no doubt of its proving a most USEFUL LENS."

J. TRAILL TAYLOR, *British Journal of Photography.*

"'OPTIMUS' LENS.—I have taken trains going at 30 miles an hour, and think the lenses perfect for rapidity and definition." E. J. WALL, *Amateur Photographer.*

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, **LONDON.**

'OPTIMUS' INFALLIBLE DEVELOPER. 1/6 sufficient for 100 ¼-plates.

FIELD AND STUDIO STANDS SUITED FOR CAMERAS OF ALL SIZES.

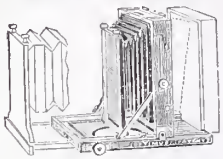
PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON.

ESTABLISHED 1852. CATALOGUE FREE.

Manufacture Lenses, Cameras, and Photographic Apparatus.

'OPTIMUS'

(TRADE MARK.)

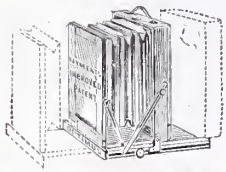


WIDE-ANGLE (Long Focus) CAMERA.

Price, including Three Double Dark Slides.

4¼ by 3¼	6½ by 4¾	8½ by 6½	10 by 8	12 by 10	15 by 12
140 -	**165 -**	**188 -**	**235 -**	**288 -**	**350 -**

This Instrument possesses every possible advantage, being very light very rigid, and very portable. The focussing screen and body may be brought towards the front of baseboard so as to prevent obstruction when using lenses of wide angular aperture and short focus. It is provided with double-swing arrangement and long focussing (rack) adjustment. When closed, the lens may remain attached to its proper position (the front) and project through the turntable in the baseboard.



RAYMENT'S IMPROVED (Long Focus) CAMERA.

Price includes Three Double Dark Slides.

4¼ by 3¼	6½ by 4¾	8½ by 6½	10 by 8	12 by 10	15 by 12
120 -	**145 -**	**168 -**	**212 -**	**258 -**	**314 -**

"The 'Rayment' Camera in particular, claims attention, both for its BEAUTY OF WORKMANSHIP and for the EASE and READINESS with which it can be put into action."—*The Camera.*

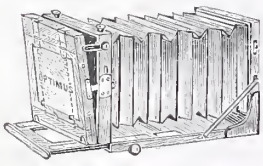


'OPTIMUS' (Long Focus) ECONOMIC CAMERA.

A strongly-made, serviceable Instrument, with Taper Bellows, Rising Front, and other modern adjustments.

Including Three Double Dark Slides.

4¼ by 3¼	6½ by 4¾	8½ by 6½
98 -	**114 -**	**136 -**

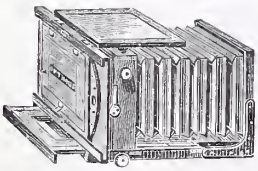


'OPTIMUS' (Long Focus) CAMERA.

Price includes Three Double Dark Slides.

4¼ by 3¼	6½ by 4¾	8½ by 6½	10 by 8	12 by 10	15 by 12
112 6	**131 -**	**161 -**	**227 -**	**275 -**	**333 -**

"I should strongly recommend Rayment's Camera It is LIGHT, COMPACT, very RIGID, and extends to about double the usual focus."—*Amateur Photographer.*

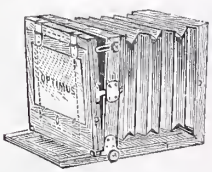


'OPTIMUS' STUDIO CAMERA (Long Focus.)

With Repeating Frame, Masks, and one Single Dark Slide, Rack Focussing, and Rack Swing.

6½ by 6½	8½ by 8½	10 by 10	12 by 12	15 by 15
145 -	**188 -**	**225 -**	**265 -**	**325 -**

'Invited to say if in our estimation, the Studio Came as of Perken, Son and Rayment could be improved in any way whatever for the purpose for which they are intended, we must answer, 'No.''—*British Journal of Photography.*



PORTABLE (A.R.) CAMERA.

COMPACT, RIGID, AND OF EXCELLENT FINISH

This Instrument has Leather Bellows, and is fitted with hinged Focussing Screen, adjusted by Rack and Pinion, Square Reversing Back, so that horizontal or vertical pictures may be taken without removing Camera from Stand (Double Swing.)

Price of Camera, including Three Double Dark Slides.

4¼ by 3¼	5 by 4	6½ by 4¾	8½ by 6½	10 by 8	12 by 10	15 by 12
85 -	**37 -**	**98 -**	**125 -**	**150 -**	**200 -**	**265 -**

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON.

'OPTIMUS' PHOTOGRAPHIC COMPETITION. Prizes, £105.

FIELD & STUDIO STANDS SUITED FOR CAMERAS OF ALL SIZES.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct. **LONDON,**

ESTABLISHED 1852. CATALOGUE FREE.

Manufacture Lenses, Cameras, and Photographic Apparatus.

'OPTIMUS'

(TRADE MARK).

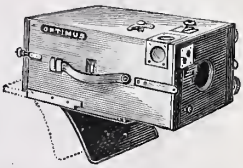
'OPTIMUS' UBIQUE HAND CAMERA.



Pictures 4½ by 3¼in.
For use on Tripod or in Hand.
Carries Six Dry Plates. Three Dark Slides.
Focussing Screen, View Finder, Shutter, &c.

Price, with Rapid View Lens **55/-**
With Rapid Rectilinear **80/-**
" " Euryscope **105/-**

'OPTIMUS' (PATENT) MINIMUS HAND CAMERA.

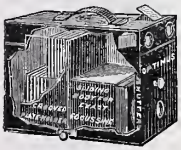


Outside Dimensions, 8 by 3½ by 5in. For Plates 4½ by 3¼.

This Camera has no Dark Slides, but carries Twelve Dry Plates. They place themselves consecutively before the Lens; each, after exposure, is removed to the back of the others by means of the little bag underneath the instrument. The register indicating the number of the plate offered for exposure, renders it impossibe for the same plate to be twice exposed. It is provided with Focussing Adjustment and View Finder, also with a Curtain Shutter which gives slow or rapid exposures.

Price with 'Optimus' Rapid Euryscope ... **147/-**

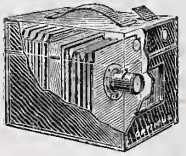
'OPTIMUS' MAGAZINE HAND CAMERA.



Pictures 4¼ by 3¼in.
Carries Twelve Dry Plates. No Dark Slides.
Plates changed by turning a button.

With Rapid Rectilinear **126/-**
" " Euryscope **147/-**

'OPTIMUS' DETECTIVE HAND CAMERA.



The Shutter will give exposures of varied duration. The exactness in focussing is simple. The exterior is covered with leather, and measures 9¼ by 5½ by 7½. (Negatives 4¼ by 3¼).

With Rapid Rectilinear Lens, working at F/8 ... **126/-**
" " Euryscope, working at F/6 ... ... **147/-**

'OPTIMUS' PHOTOGRAPHIC OUTFITS.



Fitted Complete in Box with Tripod Stand.

Quarter-plate ... ... (4¼ by 3¼), **36/-**
Half-plate ... ... (6½ by 4¾), **70/-**
Quarter-plate Size (as diagram) **45/-**
Half-plate, with Rack and Pinion Adjustment **115/-**
Whole-plate ... ... (8¼ by 6½), **190/-**

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, **LONDON.**

'OPTIMUS' PHOTOGRAPHIC COMPETITION. PRIZES, £105.

OPTIMUS. PHOTOGRAPHIC COMPETITION. PRIZES, £105.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON.

ESTABLISHED 1852. CATALOGUE POST FREE.

Manufacture Lenses, Cameras and Photographic Apparatus.

'OPTIMUS'

(TRADE MARK.)

'OPTIMUS' STEREOSCOPIC LENSES.

Sold in Pairs, accurately matched. Giving brilliant definition, and covering 3¼ by 3¼ perfectly.

Rapid Rectilinear Aperture F/8 ... ... per pair **80/-**
„ Euryscope „ F/6 ... ... „ **120/-**

The above are recommended for either Stereoscopic Slides or Photographic Transparencies for Magic Lantern Projection; being of short focus and fairly wide angle, they include a very comprehensive amount of field. The Optical quality is such that the resulting pictures will bear almost unlimited enlargement.

OPINIONS OF 'OPTIMUS' LENSES.

"OPTIMUS RAPID EURYSCOPE," manufactured by the firm of Perken, Son and Rayment, Hatton Garden. With its full aperture of 1¾in. (its equivalent focus being 11in.) it defines with extreme brilliancy, and when used with a stop it easily covers a 10 by 8 plate to the corners, which is larger than that engraved on the mount as its possibility. Working as it does with such a large aperture (*f*/6 approx.) it serves as a portrait and group lens, as well as a landscape and copying objective. There is no doubt of its proving a most useful lens. —J. TRAILL TAYLOR.—*British Journal of Photography.*

"OPTIMUS EURYSCOPE."—I am much pleased with the 9 by 7 received last week. It covers 12 by 10, and gives splendid definition. For a good, useful, all-round lens I consider it perfect.—E. BRIGHTMAN, Hon Sec. Bristol and West of England A.P.A.

"OPTIMUS EURYSCOPE."—When in your establishment you kindly lent me one of your 7 by 5. I like the lens so well, I do not want to part with it. CHAPMAN JONES, F.I.C., F.C.S.

"OPTIMUS EURYSCOPE."—This lens is of extra large diameter, the aperture being *f*/6, and, while admitting of the most rapid exposures, gives fine marginal definition. We have obtained with it excellent portraits in an ordinary sitting-room. The lens is a most useful one all-round.—T. C. HEPWORTH.—*The Camera.*

As I have often said before, I consider these lenses unequalled.—E. J. WALL, *Amateur Photographer.*

I have tried the 7 by 5 "OPTIMUS" Euryscope. It is a very satisfactory lens, and covers the *whole plate* for interiors with *f*/16; being able to work at *f*/6 makes it very handy for portraits.—J. G. P. VEREKER.

Frith's series of "Life in London Streets" were all taken with 12 by 10 *Portable* "OPTIMUS" lens. Had an "Optimus" *rapid* symmetrical been used, the plates would have been over exposed with full aperture.—G. LINDSAY JOHNSON, M.A., M.B., F.R.C.S., England.—*Amateur Photographer.*

PORTRAIT LENS.—The "Optimus" lenses are moderate in price, and yield most excellent results.—*Amateur Photographer.*

"OPTIMUS" LENS.—I have taken trains going at 30 miles an hour, and think the lenses perfect for rapidity and definition.—E. J. WALL.—*Amateur Photographer.*

. . . We may call attention to the extensive optical and metal works that Perken, Son and Rayment have established in Hatton Garden, and their photographic cabinet factory in Saffron Hill. At the former we were much interested in the glass grinding departments—one for photographic lenses, another for spectacles; and we were surprised to find in London such extensive workshops for the metal parts of cameras and optical lanterns.—*Photographic News.*

We are pleased to find upon trial that the Lens ["Optimus" Rapid Rectilinear] sent for review is really an excellent instrument.—*Photographic News.*

If E. G. E. wants the finest lens in the market, he cannot do better than get the "OPTIMUS."—Professor DE FRERE.—*Amateur Photographer.*

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON.

OPTIMUS RAPID EURYSCOPE FOR PORTRAITURE.

PRINTING FRAMES, DEVELOPING DISHES, GRADUATED MEASURES, &c.

PERKEN, SON & RAYMENT,

99, Hatton Garden, Holborn Viaduct, LONDON.

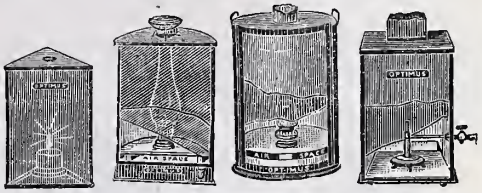
ESTABLISHED 1852. CATALOGUE FREE.

MANUFACTURING OPTICIANS.

'OPTIMUS'

(TRADE MARK.)

2/6 **7/4** **13/-** **13/-**



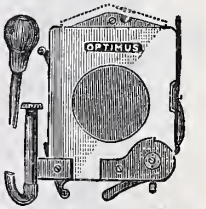
SUPERIOR DARK ROOM DEVELOPING LAMPS

'OPTIMUS'
. PATENT
PLUNGE SHUTTER,

With Pneumatic Release.

For ½ x ½ Optimus Lens **30/-**
„ ¼ „ „ **36/-**
„ 10 x 8 „ „ } **48/-**
„ 12 x 10 „ „ }

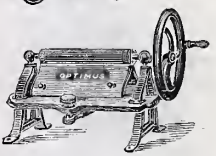
"Mr. J. Traill Taylor exhibited a pneumatic shutter, giving exposures of any duration, at will, and avoiding all vibration. He stated it was one of the best shutters he had seen, and said it was made by Perken, Son and Rayment."—*British Journal of Photography.*



This may be styled the most **PORTABLE** of shutters. It is made either to fit on the bood or may be adapted to act between the lenses of the doublet.

'OPTIMUS' BURNISHER For PHOTOGRAPHIC PRINTS.

The Burnishing Bar is specially hardened. The Frame is of a superior and convenient construction. It is Nickel-plated, and of beautiful finish.

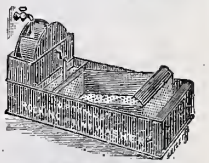


	½	¼	⅛	⅒	⅟₁₂
Price	**30/-**	**36/-**	**45/-**	**60/-**	**90/-**

Larger to order.

'OPTIMUS' ROCKING PRINT WASHER.

Water running from a tap revolves the wheel which is connected with the cradle, causing it to rock up and down at each revolution. A syphon is fitted to drain the tank. One hour's washing is ample.



9 x 7 cradle **18/6** | 13 x 11 cradle **32/-**
11 x 9 „ **28/-** | 16 x 13 „ **39/6**
20 x 16 cradle **50/-**

'OPTIMUS' CAMERA CASES.

With Shoulder Straps.

LINED WITH GREEN CLOTH.



SQUARE—	½	¼	⅛	⅒
Canvas...	**15/9**	**20/-**	**21/6**	**28/-**
Leather..	**20/-**	**29/-**	**35/-**	**46/-**

OBLONG—	¼	½	¹/₁
Canvas only...	**10/6**	**15/-**	**20/-**

'OPTIMUS' PORTABLE STANDS



	¼		½		¹/₁		⅛	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Telescopic, with sliding leg adjustment, rigid ...	**8**	**6**	**9**	**6**	**10**	**9**	**16**	**9**
Folding Ash, with Bayonet Joint, "E.P.," very rigid	**9**	**9**	**10**	**9**	**12**	**6**	**20**	**3**
Telescopic Ash, with sliding leg adjustment, Maudsley pattern	**18**	**6**	**19**	**9**	**20**	**9**	**24**	**9**
Telescopic Ash, 3-fold, as sketch	...		**22**	**0**	**24**	**0**	**29**	**0**
'OPTIMUS' Stand, very rigid, and much recommended for large sizes	...		**15**	**0**	**16**	**0**	**22**	**6**
Pine Studio Stands, with rack	...		...		...		**43**	**9**
Mahogany	...		...		...		**78**	**9**

Rigid 4-fold Tripod, 16 inches long, when closed, **20/-**

PERKEN, SON & RAYMENT,

99, Hatton Garden, Holborn Viaduct, LONDON.

CAMERA CASES, CHANGING AND DEVELOPING TENTS, BURNISHERS, &c.

"THE MAGIC LANTERN: ITS CONSTRUCTION AND USE," cloth covers, 6d.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON.

ESTABLISHED 1852. CATALOGUE FREE.

Manufacture Lenses, Cameras, and Photographic Apparatus.

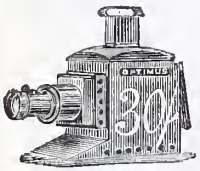
'OPTIMUS'

(TRADE MARK)

MAGIC LANTERNS.

Adapted for use with Limelight. For Dissolving, Two Lanterns are necessary.

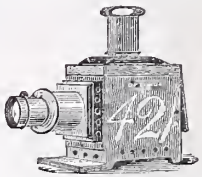
Each Magic Lantern is efficient for exhibitions. The Lens gives crisp definition, being a superior Achromatic Photographic Combination (large diameter back lens), with rack and pinion. It is fitted to a telescopic lengthening tube, so gaining increased focal accommodation. The Condenser is composed of two plano-convex lenses of four inches diameter. The refulgent lamp has three wicks (or four wicks, 2s. extra), yielding a brilliantly illuminated picture. Each is complete in box.



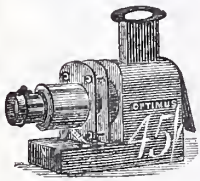
Japanned Metal, **30/-**



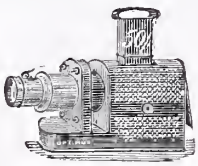
Student's Lantern (to take demonstrating tank) with finished Brass Sliding Tubes, **40/-**



Mahogany outside Body, Japanned Metal Stages and Sliding Tubes, **42/-**



Russian Iron Body, Brass Sliding Tubes, **45/-**



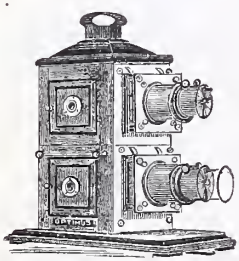
Perforated Russian Iron Body Brass Sliding Tubes, **50/-**



Mahogany outside Body, 2 Panelled Doors, Brass Stages, and Sliding Tubes, **82/-**

'OPTIMUS' LANTERNS, FOR LIMELIGHT.

The Top Lantern may be used separately with Oil Lamp.



TRIPLE.

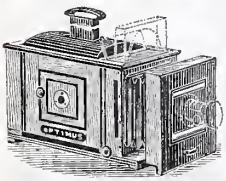
Seasoned Mahogany Body, 6 Panelled Doors, Moulded Foot, Brass Stages and Tubes, Achromatic Front Lenses, Compound Condensers ... **£14 10 0**

BI-UNIAL.

Seasoned Mahogany Body, 4 Panelled Doors and Moulded Foot, picked out with black, Achromatic Photographic Front Lens, Compound Condensers, all Brass Stages & Tubes **£8 8 0**

'OPTIMUS' ENLARGING APPARATUS.

Patent Quick-acting Rack Adjustment.



This apparatus comprises superior Mahogany Body Lantern and Long Bellows Camera adjusted by Rack and Pinion. The Lantern is fitted with powerful Refulgent Lamp, with 3 wicks, giving brilliant illumination. Compound Condensers.

CONDENSER.	s.	d.
5-in., no front lens ...	**100**	**0**
5-in., with ,, ...	**127**	**0**
6-in., no ,, ...	**133**	**0**
6-in., with ,, ...	**151**	**0**
7-in., no ,, ...	**155**	**0**
7-in., with ,, ...	**173**	**0**
8-in., ,, ,, ...	**256**	**0**
9-in., ,, ,, ...	**290**	**0**
10-in., ,, ,, ...	**360**	**0**
12-in., ,, ,, ...	**580**	**0**

With Russian Iron instead of Mahogany Body	s.	d.
5-in., no lens	**75**	**0**
5-in., and ,, ...	**102**	**0**
6-in., no ,, ...	**87**	**6**
6-in., and ,, ...	**115**	**6**
7-in., no ,, ...	**110**	**0**
7-in., and ,, ...	**137**	**9**
8-in., no ,, ...	**160**	**0**
9-in., ,, ,, ...	**250**	**0**
10-in., ,, ,, ...	**285**	**0**
12-in., ,, ,, ...	**450**	**0**

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, LONDON.

MAGIC LANTERN TRANSPARENT PHOTOGRAPHS, PLAIN, 12/-; COLOURED, 18/6 Dozen

OPTIMUS PHOTOGRAPHIC COMPETITION. PRIZES, £105.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, **LONDON.**

ESTABLISHED 1852. CATALOGUE FREE.

Manufacture Lenses, Cameras and Photographic Apparatus.

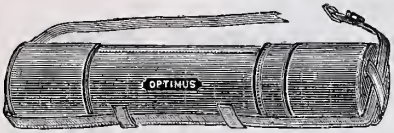
'OPTIMUS'

(TRADE MARK.)



SPECTACLES & EYEGLASSES

Oculists' formulæ accurately and promptly executed.



'OPTIMUS' ACHROMATIC TELESCOPES.

Diameter of Object Glass..	1 in.	$1\frac{3}{16}$	$1\frac{7}{16}$	$1\frac{11}{16}$	2
Morocco covered bodies—	s. d.	s. d.	s. d.	s. d.	s. d.
Brass mounts, three draws.....	5 9	8 0	15 0	21 0	..
Ditto, ditto, and spray or sunshades	7 0	10 6	17 6	23 0	..
Oxidised mounts, three draws, cap and sunshades	..	15 6	23 0	30 0	41 0
"Army," Morocco covered bodies— Oxidised mounts, four drawers....	..	31 0	41 0	58 0	72 0
"Navy" or "Day and Night," Morocco covered bodies— One draw, with shades	..	30 0	41 0	60 0	82 0
"Government," Morocco covered bodies— Pancratic, three draws, with shades	..	42 0	54 0	72 0	90 0
"Yachtsman," Morocco covered bodies— Tapered, one draw, with shades ..	..	34 0	42 0	57 0	77 0
"Rifleman's," Morocco covered bodies— Two draws, exceptionally portable, but having high power.....	..	29 0	34 0	..	..
With still higher power	..	..	40 0	..	..
"Deerstalker," Morocco covered bodies— Three draws, cap and sling.....	..	26 6	..	44 0	58 0
"Viceroy," Morocco covered bodies— Three draws	..	25 0	..	40 0	55 0
"Empress," for Ladies' use, being very LIGHT POLISHED ALUMINIUM bodies, covered with superior leather, three draws	80 0	95 0	..	130 0	..

Wood Tripod Stands for Telescopes, with gutter Tops, adjustable, from **13/-** to **30/-**

ASTRONOMICAL TELESCOPES

With Mechanical Motions

Mounted on Brass or Wood Stands.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS" INFALLIBLE DEVELOPER, 1/6 sufficient for 100 ¼-plates.

MICROSCOPES, TELESCOPES, BAROMETERS, THERMOMETERS.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, **LONDON,**
ESTABLISHED 1852. CATALOGUE FREE.

MANUFACTURING OPTICIANS,

'OPTIMUS'

(TRADE MARK).

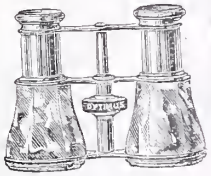
For General Excellence, Definition, and Magnifying Power we invite intending Purchasers to test our Field Glasses against any in the World.

ALUMINIUM BODIES TO ANY OF THESE BINOCULARS AT INCREASED PRICES.

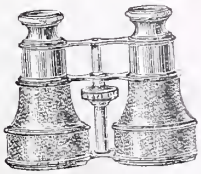
'OPTIMUS' GUINEA OPERA,
Morocco covered,
21/-



'OPTIMUS' PEARL OPERA,
From **25/-** to **150/-**



'OPTIMUS' QUEEN OPERA.
From **50/-** to **100/-**



'OPTIMUS' SCORER

Is unrivalled for Excellence and cheapness. It shows the number of People in Boats four miles distant, Sea-birds one mile distant, and Bullet-marks on Target at 600 yards ..... Magnifying 25 times .....

30/-



'OPTIMUS' SCOUT.

Medium Size .....
Clear Definition.....
Good Field .....
High Magnifying Power (64 times) .....

70/-



'OPTIMUS' MARKSMAN

Wide Field of View .....
Brilliant Definition ...
Medium Size .....
Magnifying 49 times.. ...

84/-

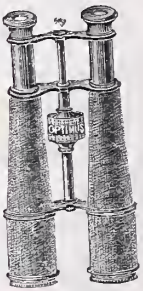


'OPTIMUS' BINOCULAR or DOUBLE TELESCOPE.

This Instrument has Bending Bar for Exact Visual Adjustment.....
The Size is Moderate .....
The Definition is Crisp .....
Very high (144 times) Magnifying .....

80/-

If with Shades, as Diagram **100/-**



OPERA GLASSES IN GREAT VARIETY.

PERKEN, SON & RAYMENT, 99, Hatton Garden, Holborn Viaduct, **LONDON.**

SPECTACLES, FOLDERS, OCULISTS' FORMULÆ ACCURATELY & PROMPTLY EXECUTED.



A Study by BERNARD ALFIERI

AGAINST THE SKY.

Printed by THE GRAPHOTONE CO., Bush Hill Park, Enfield.

PHOTOGRAPHY ANNUAL.

A Compendium of Information

upon

PHOTOGRAPHIC MATTERS,

and the

ANNALS OF PHOTOGRAPHY

for the past year.

1892.

Edited by Henry Sturmey.

LONDON:

ILIFFE & SON, 3, ST. BRIDE ST., LUDGATE CIRCUS, E.C.

Newman & Guardia

MANUFACTURERS OF SCIENTIFIC APPARATUS.

LEADING PHOTOGRAPHIC SPECIALITIES

To be obtained of all Dealers, or direct.

THE "NEWMAN" SHUTTER, ORDINARY FORM

(With Pneumatic Regulation and Release).

Has been the leading Shutter since its introduction in 1886, and is now known to all photographers throughout the world.

THE "NEWMAN" SHUTTER, NEW IMPROVED FORM

(With Pneumatic Regulation and Release).

Is specially suited to light Cameras, being still neater in appearance than the ordinary form, and its working parts having been reduced in weight and counterbalanced.

THE "N. & G." STUDIO SHUTTER

(Pneumatically Actuated).

Works inside the Camera, without noise, and unobserved by the sitter; is completely under control, and cannot get out of order. The favourite Shutter of the leading professionals at home and abroad.

THE "N. & G." NEW ALUMINIUM BLIND SHUTTER

(With Pneumatic Regulation and Release).

Is the most perfect Blind Shutter ever manufactured. It has our patent regulation for "time" and rapid exposures, and is made on new lines throughout. No string to pull or spring to regulate.

THE "N. & G." NEW HAND CAMERA

(For Plates or Films).

We are actively preparing to place in the market this, the latest outcome of our long experience in the making and use of Hand Cameras. Particulars will be announced in a short time.

THE "N. & G." NEW CHANGING-BOX AND CARRIERS

(For Plates or Films).

A perfect changing box is, at last, offered to the public. Greatly reduced in size and weight. With new and improved changing mechanism, and an index showing number of exposures. It cannot get out of order. The plate or film carriers may be had separately; they are the lightest, best made, and most efficient in the market.

Descriptive Price List Post Free on Application.

NEWMAN & GUARDIA, MANUFACTURERS OF SCIENTIFIC APPARATUS.

71, Farringdon Road, LONDON, E.C.

THE GETTY CENTER LIBRARY

THOMAS'S

Complete Catalogue

OF

PURE CHEMICALS, SPECIALITIES, AND ALL PHOTOGRAPHIC REQUISITES,

Manufactured by the Firm for the last 40 years,

Post Free on application.

THOMAS'S

CELEBRATED DEVELOPERS

HYDROKINONE (Bottles Rubber-stoppered), in Travelling Cases, two ½ pints, concentrated	3/-
PYRO-AMMONIA, in Travelling Cases	3/- and 4/6
" " " " For Lantern Plates	3/9
PYRO-POTASH " "	4/-
FERROUS OXALATE	3/6

R. W. THOMAS & Co.,

LIMITED,

10, PALL MALL, S.W.

Telegraphic Address: "RUHTRA, LONDON." Telephone No. 35,037.

[*See following pages.*

THOMAS'S

Special Cyclist

OR

DETECTIVE CAMERA PLATES.

28 W.

Quarters, 5 x 4in., and 12 x 9 cm.

ON THIN LANTERN PLATE GLASS.

FOR PRICES see Page xx.

NOTE THE REDUCTION IN PRICE

OF THE

Pall Mall Celluloid Films

WILL BE FOUND SUPERIOR TO ANY OTHER BRAND.

Cyclist, Thickly Coated Landscape. Thickly Coated Extra Rapid.

At the same prices as our Thickly-coated Plates.

See Page xix.

R. W. THOMAS & Co., LTD.,

10, PALL MALL, LONDON, S.W.

Telegraphic Address: "RUHTRA, LONDON." Telephone No. 35,037.

[See preceding and following pages

THOMAS'S PLATES

(THE PALL MALL).

SIZES AND PRICES PER DOZEN.

Inches.	Cyclist Thickly-coated. 28 W.	Thickly-coated Landscape. 18 W.	Thickly-coated Extra Rapid. 25 W.	Extra Rapid. 25 W.
	s. d.	s. d.	s. d.	s. d.
4¼ × 3¼	1 6	1 6	1 6	1 0
5 × 4	2 4	2 4	2 4	1 7
6½ × 4¾	3 6	3 6	3 6	2 3
7½ × 5	4 6	4 6	4 6	3 6
8½ × 6½	6 6	6 6	6 6	4 3
9 × 7	7 6	7 6	7 6	5 0
10 × 8	10 0	10 0	10 0	7 3
12 × 10	14 6	14 6	14 6	10 6
15 × 12	23 0	23 0	23 0	18 0
Centimètres.	**Cyclist Thickly-coated. 28 W.**	**Thickly-coated Landscape 18 W.**	**Thickly-coated Extra Rapid. 25 W.**	**Extra Rapid. 25 W.**
	s. d.	s. d.	s d.	s. d.
9 × 12	1 10	1 10	1 10	1 2
13 × 18	4 3	4 3	4 3	2 9
15 × 21	5 9	5 9	5 9	3 9
18 × 24	7 6	7 6	7 6	5 0
21 × 27	10 9	10 9	10 9	7 6

Specially adapted for use in India and other Hot Climates.

R. W. THOMAS & CO.

(LIMITED),

10, Pall Mall, London, S.W.

Telegraphic Address: "RUTHRA, LONDON." Telephone No. 35037.

[*See preceding and following pages.*

COLLODIO-BROMIDE ENTIRELY SUPERSEDED

BY THOMAS'S

LANTERN OR TRANSPARENCY EMULSION.

The finest thing yet achieved.

For all kinds of Transparency Work or Opals, Micro-photography, Enlarging, or Copying, nothing better can be desired.

Lantern Plates 3¼ x 3¼in., 1/- per dozen on thin glass. All other sizes coated and charged at Pall Mall Extra Rapid prices.

Opal Glass, Flashed or Pot, and a fine Ground Glass coated at shortest notice.

All Colours are obtainable with the greatest facility without toning.

PRICES.

3¼ x 3¼, on thin glass, 1/- per dozen.

4¼ x 3¼	Ordinary Glass	...	...	...	1/- per doz.;	Fine Ground Glass,		1/6 per doz.		
6½ x 4¼	,,	...	...	...	2/3	,,	,,	,,	3/3	,,
8½ x 6½	,,	...	...	...	4/3	,,	,,	,,	6/-	,,
10 x 8	,,	...	...	...	7/3	,,	,,	,,	9/7	,,
12 x 10	,,	...	...	...	10/6	,,	,,	,,	14/6	,,

THOMAS'S CELEBRATED

"PALL MALL" OPAL PLATES.

PRICES.

4¼ x 3¼	...	...	...	...	...	...	...	...	Half Dozen,	1/-	One Dozen,	1/6
6½ x 4¼	...	...	...	...	...	...	...	...	,,	2/-	,,	3/6
8½ x 6½	...	...	...	...	...	...	...	...	,,	3/6	,,	6.6
10 x 8	...	...	...	...	...	...	...	...	,,	5/6	,,	10/-
12 x 10	...	...	...	...	...	...	...	...	,,	7/6	,,	14/6

R. W. THOMAS & CO.,

LIMITED,

10, PALL MALL, LONDON, S.W.

Telegraphic address "RUHTRA, LONDON." **Telephone No. 35037.**

[See preceding pages.

PREFACE.

IN placing the second volume of PHOTOGRAPHY ANNUAL before the public, we have to tender our best thanks to our supporters of last year for the very striking success they enabled us to record. To enter the field with a new annual, in the face of three or four well-known and established publications already there, was in itself a bold undertaking, which was made still more so by the fact of twice the price of the others being necessitated by the bulky nature and character of the book. In spite of this, however, the success of the first PHOTOGRAPHY ANNUAL was phenomenal. It sold, in fact, faster than our binders could complete the copies, and the entire edition of 5,000 was sold out in a little over a fortnight. This appreciative encouragement of our efforts has induced us to still further extend the scope and interest of the book, and in every way possible to make it, without doubt, *the* book of the year for photographers. In the present volume we have made several additions to the tables given in Section I., as well as corrected others up to date. In Section II., beginners in the art will find many useful "tips" and helpful suggestions, based on the practical experience of one who, now proficient, does not forget that he was himself a beginner once. Section III.—"The Annals of Photography"—made so palpable a "hit" last year, especially in scientific circles, that we have continued it on identical lines; whilst in Section IV., we think our readers will notice a decided advance upon last year. In this section we last year included only selected articles by well-known writers, most of whom were specially asked to lend their aid with contributions. This year, keeping to our principle of paying for everything we use, we made no special requests to anyone, but invited all practical men to submit practical articles for consideration, and in the result we had a very large number of good practical articles of real merit to select from. Needless to say, many were perforce rejected, and we trust the selection we have made may commend itself to our readers. Sections V. and VI., although—doubtless on account of their novelty and value—they met with much adverse criticism from proprietors of other Annuals, have been received with every mark of approval and satisfaction both by the reading and buying public, and we therefore continue them

as before, bringing up to date from last year information concerning novelties in apparatus and processes which have, during the past twelve months, seen the light. Section VII. brings the record of the societies and their officers to the highest point yet reached, and we may here say that neither pains nor expense have been spared to make the record absolutely reliable and complete, as many as four successive applications having, in some instances, been made to inattentive secretaries for the information required. In Section VII. we make a fresh departure, and deal with a matter which has never before received the attention of photographic publishers. A permanent and easily available record of registered trade marks must prove of considerable value and interest to photographic commercialists, and although the compilation and illustration has been a matter of very considerable expense we have undertaken it, as we believed it to be a long-felt want in trade circles. The directories to the several branches of the trade and to the dark rooms available for tourists, which are given in Section IX., have been carefully revised and extended, and although we would not for a moment claim them to be either absolutely perfect or complete we venture to assert that they are far ahead of anything hitherto attempted, either by ourselves or others, and that they will prove of immense value in the coming year. Our special feature of illustrating by specimens the work of the leading photo-mechanical process workers, and thus placing side by side for comparison with the work of English houses the productions of America and the Continent, has been largely appreciated and still further extended in the present volume, though in this connection we have to make an apology to our readers which we very much regret. We had intended giving as a frontispiece a platinotype picture on the new platinotype paper, printed by the new oxy-magnesium light, thus showing the possibility of book illustration in large numbers by a direct photographic process, but although all our arrangements were made—and we had indeed announced it—the Platinotype Company disappointed us at the last moment, and we were compelled to forego it. As with the first ANNUAL my efforts as Editor have been ably seconded by Messrs. C. H. Bothamley, Albert Taylor, H. Chapman Jones, Walter D. Welford, and other contributors to our pages, and I desire here to express my indebtedness to each and all.

HENRY STURMEY,

EDITOR.

JUNE 1ST, 1892.

A REALLY QUICK PLATE

AT A

POPULAR PRICE.

ELLIOTT & SON'S

NEW "STUDIO" PLATE

Feeling that a Plate of this description is needed by photographers, we have **greatly increased the rapidity** of our "Studio" Plate, which, however, will be **sold at the ordinary price.** At the same time, we would point out that the **special features** of the Plate have not been interfered with. The Plates are **quickly developed** up to **full printing density,** and only require a short time for fixation.

For OUTDOOR WORK, GROUPS, &c., we strongly recommend our

"Barnet" Plate,

as although it is a very quick Plate, it allows considerable latitude in exposure, thus ensuring

UNIFORMLY SATISFACTORY RESULTS.

Prices of the "Studio" and "Barnet" Plates.

¼-plate, 1/-; ½-plate, 2/3; 8½ x 6½, 4/3; 12 x 10, 10/6 per doz.
Other sizes in proportion.

Elliott & Son's Ready Sensitised Paper.

White or Tinted, per quire, 14/-; ½-quire, 7/6; ¼-quire, 4/-, post free, cash with order.

ENLARGEMENTS and PRINTING. } In Carbon, Bromide, Platinotype, and Silver.

FULL PRICE LIST ON APPLICATION.

ELLIOTT & SON, BARNET, HERTS

USE

SCHÖLZIG'S

Sensitised Papers.

SCHÖLZIG'S WELL-KNOWN

Ready-sensitised Double Albumenised & Matt Surface Papers

DR. JACOBY'S NEW COLLODION PAPER.

A substitute for Albumenised Paper, and warranted not to blister.

Dr. Jacoby's Direct Printing Platinum (Pizzighelli) Paper.

The Simplest of Photographic Printing processes in existence.

Dr. Jacoby's Chloride of Silver Emulsion Paper

By far the best and richest Paper of the kind in the market, yielding Tones from Sepia to Black at the will of the operator.

With all Papers the most complete Instructions are sent out, making success a certainty.

FULL PARTICULARS & INSTRUCTIONS ON APPLICATION TO

Otto Schölzig,

31, BINFIELD ROAD, CLAPHAM ROAD, LONDON, S.W.

Telegraphic Address "Obtestor, London."

CONTENTS.

FRONTISPIECE—Against the Sky. PAGE

SECTION I.—Useful Tables of Reference for Practical Photographers. 9

SECTION II.—Tips for Tyros: being Useful Hints on Photographic Procedure for the Use of Beginners, comprising:—Preparatory Tips for Touring Tyros - Tips in the Field—Tips in the Dark Room—Hand Camera Tips - Tips on Printing, Toning, etc.—Mounting Tips—Tips on Lantern Matters 37

ILLUSTRATION—"Eashing Bridge" or "A Kentish Lane." *To face* 56

SECTION III.—The Annals of Photography: being a Record of Progress in the several branches of the Science and Practice of Photography during the year 1891, including Photographic Chemistry, Astronomical Photography, Spectroscopy, Meteorology, Photographic Optics, Photo-mechanical Printing, and Photographic Art 67

ILLUSTRATION—"Iffley Mill, on the Thames" .. .. *To face* 83

ILLUSTRATION—"The Milky Way in the region of α Cygni" ,, 120

ILLUSTRATION—"The Milky Way in the region of β Cygni" ,, 136

ILLUSTRATION—"International Photographic Chart of the Stars" .. .. ,, 144

ILLUSTRATION—"A Meteorite" .. .. .. ,, 152

ILLUSTRATION—"An Interested Sitter" .. .. ,, 168

SECTION IV.—Selected Articles on Practical Subjects, by Practical Men 187

ILLUSTRATION—"Medmenham Abbey" .. .. *To face* 200

ILLUSTRATION—"Photographic Representation of Colour" *To follow* 240

SECTION V.—The Latest Novelties in Photographic Apparatus, Appliances and Processes, forming a continuation and bringing up to date of the information contained in the "Photographer's Indispensable Handbook," and "Photography Annual, 1891". .. 279

ILLUSTRATION—"Reckoning it out" .. .. *To face* 280

PART I.—Cameras: Ordinary, Hand, Special, and Apparatus connected therewith 281

ILLUSTRATION—"Miss Mischief" .. .. .. *To face* 296

ILLUSTRATION—"Waiting for the Tide" .. .. ,, 328

PART II.—Lenses 372

PART III.—Supports: Tripod Stands, Studio Stands, Rests, and Supports 384

PART IV.—Apparatus and Accessories used before Exposure: Actinometry, Magnesium Light. Backgrounds. Studio Accessories 394

PAGE

PART V.—Shutters 403

ILLUSTRATION—"The Silver Strand, Loch Katrine" .. *To face* 408

PART VI.—Materials: Negative Plates and Films, Opal and Positive Plates and Films, Developed Papers and Print-out Papers 415

ILLUSTRATION—"Photography" .. .. .. *To face* 424

PART VII.—Chemicals and Solutions: Developers, Other Solutions and Preparations, Chemicals 440

PART VIII.—Apparatus used after Exposure: Changing Bags and Tents, the Dark Room and Development, Washing Apparatus, The Printing Room, Burnishers and Rollers, Mounts and Mounting, Various 448

ILLUSTRATION—"A Summer Idyl" .. .. .. *To face* 472

PART IX.—Complete Sets and Various 503

ILLUSTRATION—"Buckskin Bill" .. .. .. *To face* 521

PART X.—Enlarging, Copying, and Reducing Apparatus .. 521

SECTION VI.—The Latest Novelties in Optical Lanterns and Appliances relating thereto; forming a continuation of and bringing up to date of the information contained in the "Indispensable Handbook to the Optical Lantern" and "Photography Annual, 1891" .. 529

PART I.—Optical Lanterns: Single Lanterns, Biunials and Triples, Special Lanterns 531

PART II.—Accessories to Lanterns: Scientific and other Accessories, Exhibition Apparatus, Gas and Illuminating Apparatus 551

ILLUSTRATION—"My New Pinafore" .. .. *To face* 568

PART III.—Lantern Slides and Slide Apparatus: Making Slides, Carriers, etc., Sets of Slides 575

SECTION VII.—The Photographic Societies of the United Kingdom .. 601

ILLUSTRATION—"Nordfjord ved Vasenden i Loen" .. *To face* 632

SECTION VIII.—Photographic Trade Marks 665

ILLUSTRATION—"A Group of Children" .. .. *To face* 680

SECTION IX.—Information of use to and concerning the Photographic Trade: Our Illustrations, Directories to Telegraphic Addresses and Telephone Nos, Directories to the Photographic Trade, the Photographic Dealers of the United Kingdom, Dark Rooms available by Tourists 709

ILLUSTRATION—"Princess May" .. .. .. *To face* 712

INDEX to Sections I., II., III., IV., VII., VIII., and IX. .. 844

INDEX to Apparatus, Sections V. and VI. 853

INDEX to Sections V. and VI., arranged according to Firms .. 858

INDEX to Authors quoted in Section III. 862

CONTRIBUTORS 864

INDEX TO ADVERTISERS 868

ADDENDA 875

SUTER'S CELEBRATED

APLANATIC LENSES

COMPRISE

3 Rapid and 1 Wide-angle Series:

B. Effect. Aperture, F/8—for the Field.
D. Ditto F/5·5—for the Studio and Groups.
C. Ditto F/12—Wide Angle.

NEW RAPID LANDSCAPE LENS, APERTURE F/1·12.

SPECIAL LENS FOR HAND CAMERA.
Series A, $4\frac{3}{4}$ and $5\frac{1}{2}$ inch focus.

IRIS DIAPHRAGMS

APPLICABLE TO ALL THE SERIES,
Inclusive of "Wide Angle" and "Landscape."

THE

SUTER-ZEISS ANASTIGMATS.

3 SERIES are now on the market.

FITTED TO THE ABOVE—

The "VOLUTE" SHUTTER.
Time and Instantaneous Exposures.

The "BIJOU" SHUTTER (Central).

The "ARIEL" Constant Action.
Single and Stereoscopic Construction.

J. R. GOTZ, 19, Buckingham St., Strand,
Maker or Importer, LONDON.

THEVOZ & Co., OF GENEVA,

REPRESENTED BY

J. R. GOTZ

19, BUCKINGHAM ST., STRAND, LONDON,

PHOTOTYPISTS & ZINC BLOCK ETCHERS.

See specimen in this work.

SUPERIOR REPRODUCTION OF

PORTRAIT

OR

Landscape Photography

In a permanent method and highly artistic style, suitable for

SUPERIOR BOOK ILLUSTRATION

FOR

Descriptive Catalogues, Almanacks,

AND

ART PUBLICATIONS.

PRICES AND PARTICULARS FROM ABOVE ADDRESS.

SECTION I.

USEFUL

TABLES OF REFERENCE

FOR

PRACTICAL

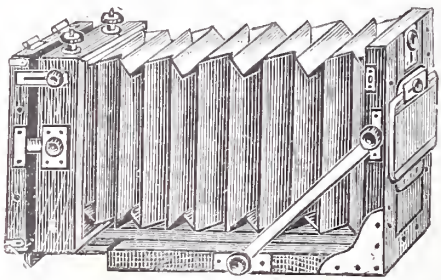
PHOTOGRAPHERS.

MANUFACTURERS TO THE TRADE ONLY.

THE

"Royalty" Cameras.

The "DUKE."
The "DUCHESS."
The "BARONESS."
The "EMPRESS."
The "COUNTESS."



THE PRINCESS

The "KING."
The "QUEEN."
The "PRINCESS."
The "BARON."
The "EARL."

THE

LONDON & PARIS OPTIC & CLOCK CO.

(WALTER H. THOMPSON)

24, late 22, Edmund Place and 7, Jewin Street, } Aldersgate St., LONDON, E.C.

SOLE AGENTS FOR GREAT BRITAIN AND IRELAND FOR THE

Celebrated "Nys" Dry Plates.

CHEAPEST AND BEST IN THE MARKET. (For Prices see page 438.)

SPECIALITIES IN "ROYALTY" LENSES AND STANDS.

Our Goods are noted for Finish and Quality all over the World.

Special attention given to Studio Cameras.

WRATTEN & WAINWRIGHT'S

'LONDON' DRY PLATES

'ORDINARY,' 'INSTANTANEOUS,' 'DROP-SHUTTER SPECIAL,'
Sensitometer No. 15. Sensitometer No. 19. Sensitometer No. 24.

FOR Fifteen years WRATTEN'S "LONDON" PLATES have held the lead in Gelatine Dry Plate Manufacture, and they possess a superiority over their numerous competitors which is indisputable. **They are recognised by competent authorities as the standard of excellence and comparison by which all other plates are tested.**

Particular attention is called to the UNIQUE QUALITY *of the* GLASS *used in the Manufacture of these Plates.*

PRICE PER DOZEN.

Size.	Ordinary.	Instantaneous.	Drop-shutter Special.
3¼ x 3¼	1/9	2/0	2/3
4¼ x 3¼	1/9	2/0	2/3
5 x 4	2/9	3/0	3/4
6¾ x 3¼	3/6	4/0	4/6
6½ x 4¼	3/6	4/0	4/6
6½ x 4¾	3/9	4/3	4/9
7¼ x 4½	4/6	5/0	5/6
7½ x 5	5/3	6/0	6/9
8 x 5	5/9	6/6	7/3
8½ x 6½	7/3	8/0	8/9
9 x 7	8/3	9/0	9/9
10 x 8	10/9	12/0	13/3
12 x 8	13/0	14/3	15/6
11 x 9	13/0	14/3	15/6
13 x 8	13/6	15/0	16/6
12 x 10	17/3	19/0	21/0
15 x 12	32/0	36/0	40/0

Prices of Foreign and larger sizes on application.

Sold by all Photographic Dealers throughout the World.

A LIBERAL DISCOUNT TO SHIPPERS & LARGE CONSUMERS.

COMPLETE ILLUSTRATED CATALOGUE POST FREE.

38, Great Queen St., LONDON, W.C.

WORKS: WEST CROYDON.

Telephone No., 2776. Telegraphic Address: "Wratten, London."

WRATTEN & WAINWRIGHT'S

CELEBRATED

SENSITISED PAPER

Pale Rose, Mauve, Blue or White.

THIS Paper prints rapidly, tones easily, keeps well, **does not blister,** and is unequalled for the uniformity, brilliancy, and quality of its results. Carefully executed pictures on this Paper are quite as permanent as those upon any other contact printing surface.

It enjoys by far the Largest Sale, and should be employed by all who desire to have the perfection of Silver Printing.

Post free—per quire, 13/6; half-quire, 7/-; quarter-quire, 4/-; three sheets, 2/3; sample sheet, 10d. Cutting to any size extra per quire, 1/-; half-quire, 6d.; quarter-quire, 3d. Special terms to dealers.

WRATTEN & WAINWRIGHT'S

Matt Sensitised Paper

PRINTED & TONED IN THE SAME MANNER AS THE ALBUMENIZED PAPER.

PRICES AS ABOVE.

Yields Charming and most Artistic Pictures.

ARISTOTYPE, BROMIDE, FERRO-PRUSSIATE, OBERNETTER, PLATINOTYPE, and all other Photographic Printing Papers in stock.

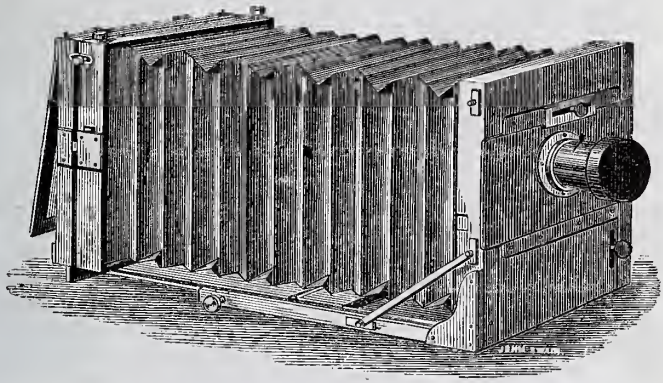
ILLUSTRATED CATALOGUE, WITH NOTES, POST FREE.

38, Great Queen St., Long Acre, London, W.C.

WORKS: WEST CROYDON, SURREY.

WRATTEN & WAINWRIGHT'S

IMPROVED LONG-FOCUS CAMERA.



These Cameras are made square, with reversing back to take the slide either vertically or horizontally. They have great length of focus, double swing back, and all the latest improvements. We strongly recommend the above Camera on account of its great rigidity and portability. It can be used for enlarging or with the shortest focus lenses, and will last a lifetime.

PRICES WITH THREE DOUBLE BACKS.

For Plates.		*Length of Focus.*	*Brass Binding extra.*	*For Plates.*		*Length of Focus.*	*Brass Binding extra.*
6½ x 4¾	£9 6 0	17½in.	£1 8 0	10 x 8	£13 18 6	28 in.	£1 15 0
7½ x 5	9 10 0	19 „	1 8 0	12 x 10	15 12 6	31 „	2 2 0
8½ x 6½	11 3 0	21 „	1 8 0	15 x 12	20 5 0	46 „	2 13 0

WRATTEN & WAINWRIGHT'S

Complete Sets of Apparatus

Are of the highest possible excellence throughout, and are strongly recommended for DURABILITY and EFFICIENCY.

Consisting of Folding Cameras, 3 Double Dark Slides, Rectilinear Lens, Leather Case, Tripod Stand, and every material for producing negatives and prints of the highest quality, both portrait and landscape.

The set for Pictures	4¼ x 3¼	£10 0 0
„ „	5 x 4	11 5 0
„ „	6½ x 4¾	14 10 0
„ „	7½ x 5	15 0 0
„ „	8½ x 6½	18 0 0

For further particulars of above and every other requirement for Photography in the Field or Studio, see ILLUSTRATED CATALOGUE, post free.

WRATTEN & WAINWRIGHT,

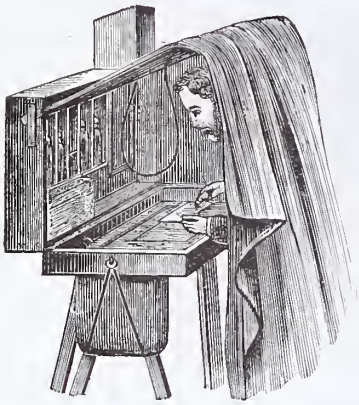
38, GREAT QUEEN St., LONG ACRE, LONDON, W.C.

WORKS: West Croydon, Surrey.

WRATTEN & WAINWRIGHT'S

Improved Portable Tents.

(VENTILATED.)



These Tents possess all the convenience of the most perfect Dark Room, combined with the greatest portability and compactness of form.

The interior arrangements are, in a practical sense, better and more complete than those of any other.

Proof against the effects of any climate—hot, cold, or damp.

To the Amateur visiting or staying in a neighbourhood where it is difficult and perhaps impossible to fit up a Dark Room, one of these Tents will prove invaluable.

Every article necessary for a short trip may be packed inside.

PRICES.

			Black Travelling Cover.	Mahogany Brass Bound.	White Canvas Travelling Cover
No. 1	.....	$8\frac{1}{2}$ x $6\frac{1}{2}$	£6 10 0	£1 3 0	£10 2 6	£1 7 0
No. 2	.....	10 x 8	7 0 0	1 7 0	10 10 0	1 10 0
No. 3	.....	12 x 10	7 10 0	1 10 0	11 5 0	1 13 0
No. 4	.....	15 x 12	8 10 0	1 11 6	12 7 6	1 16 0

Fitted with complete Sets of Bottles for Dry Plate Work, 4/- extra.

M. V. PORTMAN, Esq., of Port Blair, Andaman Islands, writes in the "Journal of the Photographic Society of India," August, 1891:—"I should advise him to get one of Messrs. Wratten & Wainwright's Improved Portable Dark Tents, made of mahogany, brass bound, with white canvas travelling cover. These tents are excellent, and I always carry one in the jungle."

WRATTEN'S BROMIDE OPALS

Possess in a corresponding degree all the high qualities which have distinguished the "LONDON" PLATES for so many years.

PRICES, per half-dozen, in Light-tight, Cloth-covered, Grooved Boxes.

$4\frac{1}{4}$ x $3\frac{1}{4}$	£0 2 0	$7\frac{1}{2}$ x 5	£0 5 6
5 x 4	0 3 0	$8\frac{1}{2}$ x $6\frac{1}{2}$	0 7 6
$6\frac{1}{2}$ x $4\frac{3}{4}$	0 4 0	10 x 8	0 10 6
12 x 10	£0 14 0		

Developer for Opals, ready prepared in two solutions, 1/9 per pint.

Apparatus, Chemicals, and every description of Photographic Requisites, of the best quality only, kept in stock.

To be obtained through any Photographic Dealer, or direct from

WRATTEN & WAINWRIGHT,

38, GREAT QUEEN STREET, LONG ACRE, LONDON, W.C.

Works—WEST CROYDON, SURREY.

SECTION I.

USEFUL TABLES OF REFERENCE

FOR

PRACTICAL PHOTOGRAPHERS.

Table Showing Displacement on Ground Glass of Objects in Motion.

By HENRY L. TOLMAN.

(Republished, with corrections, from the *Photographic Times*).

Lens 6in. Equiv. Focus, Ground Glass at Principal Focus of Lens.

Miles per Hour.	Feet per Second.	Distance on Ground Glass in Inches, with Object 30ft. away.	Same with Object 60ft. away.	Same with Object 120ft. away.
1	1½	·29	·15	·073
2	3	·59	·29	·147
3	4½	·88	·44	·220
4	6	1·17	·59	·293
5	7½	1·47	·73	·367
6	9	1·76	·88	·440
7	10½	2·05	1·03	·513
8	12	2·35	1·17	·587
9	13	2·64	1·32	·660
10	14½	2·93	1·47	·733
11	16	3·23	1·61	·807
12	17½	3·52	1·76	·880
13	19	3·81	1·91	·953
14	20½	4·11	2·05	1·027
15	22	4·40	2·20	1·100
20	29	5·87	2·93	1·467
25	37	7·33	3·67	1·833
30	44	8·80	4·40	2·200
35	51	10·27	5·13	2·567
40	59	11·73	5·97	2·933
45	66	13·20	6·60	3·300
50	73	14·67	7·33	3·667
55	80	16·13	8·06	4·033
60	88	17·60	8·80	4·400
75	110	22 00	11·00	5·500
100	147	29·33	14·67	7·333
125	183	36·67	18·33	9·167
150	220	44·00	22·00	11·000

Equations Relating to Foci.

(From the "American Annual of Photography.")

The following simple optical formulas and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes :—

p = Principal focus.
F = Greater conjugate focus.
f = Lesser conjugate focus.
r = Ratio of any dimension in original to the same dimensions in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$.

$$p = \frac{r(F+f)}{(r+1)^2}$$

$$f = p\left(\frac{1+r}{r}\right) = \frac{F+f}{r+1}$$

$$F = p(r+1) = rf$$

$$F + f = p \times \frac{(r+1)^2}{r} = p\left(2 + f + \frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$x = \frac{f_2}{16a^2}$$

N.B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p_2}{16a^2}$

Note.—In case the above may not be clear to some photographers, the following rules may be better understood :—

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground glass ($F+f$); next find the proportion which any dimension in the object bears to the same dimension on the ground glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F+f$ by r, and divide the product by the square of a number greater by one than r $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known) multiply p by the sum of $r+1$, and divide the product by r. Or divide $F+f$ by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r.

To find $F+f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F-p$ (the difference between F and p) by p. Or divide p by $f-p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example, focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass ($F+f$), which is found to be 45 inches.

Then $p = 45$ × (multiplied by) 5 ÷ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F + f = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{2} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

And x (the exposure required) will be $7\frac{1}{2} \times 8\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{2}$; that is, the exposure will be $6\frac{1}{2}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{3}{8}$ inch diameter.

"Uniform System" Numbers for Stops from f/1 to f/100.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from *f*/1 to *f*/100 compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what *f*/*a* must be in order to increase the exposure in geometrical ratio from *f*/4, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.
1	$\frac{1}{16}$
$1\frac{1}{4}$	·097
1·414	$\frac{1}{8}$
$1\frac{1}{2}$	·140
$1\frac{3}{4}$	·191
2	$\frac{1}{4}$
$2\frac{1}{4}$	·316
$2\frac{1}{2}$	·390
2·828	$\frac{1}{2}$
$2\frac{3}{4}$	·472
3	·562
$3\frac{1}{4}$	·660
3	·765
$3\frac{3}{4}$	·878
4	1·00
$4\frac{1}{4}$	1·12
$4\frac{1}{2}$	1·26
$4\frac{3}{4}$	1·41
5	1·56
$5\frac{1}{4}$	1·72
$5\frac{1}{2}$	1·89
5·656	2
$5\frac{3}{4}$	2·06
6	2·25
$6\frac{1}{4}$	2·44
$6\frac{1}{2}$	2·64
$6\frac{3}{4}$	2 84
7	3·06
$7\frac{1}{4}$	3·28
$7\frac{1}{2}$	3·51
$7\frac{3}{4}$	3·75
8	4
$8\frac{1}{4}$	4 25
$8\frac{1}{2}$	4·51
$8\frac{3}{4}$	4 78
9	5·06
$9\frac{1}{4}$	5·34
$9\frac{1}{2}$	5 64
$9\frac{3}{4}$	5·94
10	6·25
11	7·56
11·31	8
12	9·00
13	10·56
14	12·25
15	14·06
16	16
17	18·06
18	20·25
19	22·56
20	25·00
21	27·56
22	30·25
22·62	32
23	33·06
24	36·00
25	39·06
26	42·25
27	45·56
28	49·00
29	52·56
30	56·25
31	60·06
32	64
33	68·06
34	72·25
35	76·56
36	81·00
37	85·56
38	90 25
39	95·06
40	100·00
41	105·06
42	110·25
43	115·56
44	121·00
45	126·56
45·25	128
46	132·25
47	138·06
48	144·00
49	150·06
50	156·25
51	162·56
52	169·00
53	175 56
54	182·25
55	189·06
56	196·00
57	203·06
58	210·25
59	217 56
60	225·00
61	232·56
62	240·25
63	248·06
64	256
65	264 06
66	272·25
67	280·56
68	289·00
69	297·56
70	306·25
71	315·06
72	324·00
73	333·06
74	342·25
75	351·56
76	361·00
77	370·56
78	380·25
79	390·06
80	400·00
81	410·06
82	420·25
83	430·56
84	440·00
85	451·56
86	462·25
87	473·06
88	484 00
89	495·06
90	506·25
90·50	512
91	517·56
92	529·00
93	540 56
94	552·25
95	564·06
96	576·00
97	588 06
98	600·25
99	612·56
100	625 00

Prof. Burton's Table of Comparative Exposures.

Apertures Calculated on the Standard System of the Photographic Society.	Sea and Sky.	Open Landscape.	Landscape with Heavy Foliage in Foreground.	Under Trees, up to		Fairly Lighted Interiors.		Badly Lighted Interiors up to		Portraits in Bright Diffused Light out of doors.	Portraits in Good Studio Light.		Portraits in Ordinary Room.	
				mins.	secs.	mins.	secs.	hrs.	mins.		mins.	secs.	mins.	secs.
No 1, or f/4	$\frac{1}{100}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{8}$ sec.	0	10	0	10	0	2	$\frac{1}{6}$ sec.	0	1	0	4
No. 2, or f/5·657.....	$\frac{1}{80}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{4}$ sec.	0	20	0	20	0	4	$\frac{1}{3}$ sec.	0	2	0	8
No 4, or f/8.....	$\frac{1}{40}$ sec.	$\frac{1}{12}$ sec.	$\frac{1}{2}$ sec.	0	40	0	40	0	8	$\frac{2}{3}$ sec.	0	4	0	16
No. 8, or f/11·314	$\frac{1}{20}$ sec.	$\frac{1}{6}$ sec.	1 sec.	1	20	1	20	0	16	$1\frac{1}{3}$ sec.	0	8	0	32
No. 16, or f/16	$\frac{1}{10}$ sec	$\frac{1}{3}$ sec.	2 secs.	2	40	2	40	0	32	$2\frac{2}{3}$ secs.	0	16	1	4
No. 32, or f/22·627.....	$\frac{1}{5}$ sec.	$\frac{2}{3}$ sec.	4 secs.	5	20	5	20	1	4	$5\frac{1}{3}$ secs.	0	32	2	8
No 64, or f/32.....	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	8 secs.	10	40	10	40	2	8	$10\frac{2}{3}$ secs.	1	4	4	16
No. 128, or f/45·255	$\frac{4}{5}$ sec.	$2\frac{2}{3}$ sec.	16 secs.	21	20	21	20	4	16	21 secs.	2	8	8	32
No. 256, or f/64	$1\frac{3}{5}$ sec.	$5\frac{1}{3}$ sec.	32 secs.	42	40	42	40	8	32	42 secs.	4	16	17	4

Table Showing the Comparison of the Readings of Thermometers.

CELSIUS, OR CENTIGRADE (C). RÉAUMUR (R). FAHRENHEIT (F).

C.	R.	F.	C.	R.	F.
—30	—24·0	—22·0	23	18·4	73·4
—25	—20·0	—13·0	24	19·2	75·2
—20	—16·0	— 4·0	25	20·0	77·0
—15	—12·0	+ 5·0	26	20·8	78·8
—10	— 8·0	14·0	27	21·6	80·6
— 5	— 4·0	23·0	28	22·4	82·4
— 4	— 3·2	24·8	29	23·2	84·2
— 3	— 2·4	26·6	30	24·0	86·0
— 2	— 1·6	28·4	31	24·8	87·8
— 1	— 0·8	30·2	32	25·6	89·6
			33	26·4	91·4
Freezing point of water.			34	27·2	93·2
			35	28·0	95·0
0	0·0	32·0	36	28·8	96·8
1	0·8	33·8	37	29·6	98·6
2	1·6	35·6	38	30·4	100·4
3	2·4	37·4	39	31·2	102·2
4	3·2	39·2	40	32·0	104·0
5	4·0	41·0	41	32·8	105·8
6	4·8	42·8	42	33·6	107·6
7	5·6	44·6	43	34·4	109·4
8	6·4	46·4	44	35·2	111·2
9	7·2	48 2	45	36 0	113·0
10	8·0	50·0	50	40·0	122·0
11	8·8	51·8	55	44·0	131·0
12	9·6	53·6	60	48·0	140·0
13	10·4	55·4	65	52·0	149·0
14	11·2	57·2	70	56·0	158·0
15	12·0	59·0	75	60·0	167·0
16	12·8	60·8	80	64·0	176·0
17	13·6	62·6	85	68·0	185·0
18	14·4	64·4	90	72·0	194·0
19	15·2	66·2	95	76·0	203·0
20	16·0	68·0	100	80 0	212·0
21	16·8	69·8			
22	17·6	71·6	Boiling point of water.		

Readings on one scale can be changed into another by the following formulæ, in which $t°$ indicates degrees of temperature:—

Réau. to Fahr.	Cent. to Fahr.	Fahr. to Cent.
$\frac{9}{4}t° \text{ R} + 32° = t° \text{ F}$	$\frac{9}{5}t° \text{ C} + 32° = t° \text{ F}$	$\frac{5}{9}\left(t° \text{ F} - 32°\right) = t° \text{ C}$
Réau. to Cent.	**Cent. to Réau.**	**Fahr. to Réau.**
$\frac{5}{4}t° \text{ R} = t° \text{ C}$	$\frac{4}{5}t° \text{ C} = t° \text{ R}$	$\frac{4}{9}\left(t° \text{ F} - 32\right) = t° \text{ R}$

Ackland's Table for the Simplification of Emulsion Calculations.

	Equivalent Weights.	Weight of $AgNO_3$ required to Convert One Grain of Soluble Haloid.	Weight of Soluble Haloid required to Convert 1 Grain $AgNO_3$.	Weight of Silver Haloid produced by One Grain of Soluble Haloid.	Weight of Soluble Haloid required to produce 1 Grain of Silver Haloid.	Weight of Silver Haloid produced from One Grain $AgNO_3$.
Ammonium bromide	98	1·734	·576	1·918	·521	
Potassium ,, ...	119·1	1·427	·700	1·578	·633	
Sodium ,, ...	103	1·650	·606	1·825	·548	1·106
Cadmium ,, com...	172	·988	1·012	1·093	·915	
,, ,, anh...	136	1 25	·800	1·382	·723	
Zinc ,, ...	112·1	1·509	·663	1·670	·660	
Ammonium chloride	53·5	3 177	·315	2·682	·373	·844
Sodium ,, ...	58 5	2 906	·344	2 453	·408	
Ammonium iodide	145	1·172	·853	1 620	·617	
Potassium ,, ...	166·1	1·023	·977	1·415	·707	1·382
Sodium ,, ...	150	1·133	·882	1·566	·638	
Cadmium	183	·929	1·076	1·284	·778	

This table presents the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of another.

In order to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:—

Bromide of potassium	150 grains.
Iodide of potassium	10 ,,
Chloride of ammonium..	10 ,,
Gelatine	200 ,,

We want to know how much silver nitrate should be employed in sensitising this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:—

Potassium bromide.....	150 × 1·427 = 214	Weight silver nitrate. required.
Potassium iodide.....	10 × 1·023 = 10·23	
Chloride of ammonium.....	10 × 3·177 = 31 77	

Or the total quantity of silver nitrate required for full conversion, 256·00 grains.

Lanternists' Ready Reference Table.

(From "Optical Magic Lantern Journal.")

If A = focal length of objective, B = diameter of slide, C = diameter of disc on screen, D = distance between objective and screen, then $D = \frac{C \times A}{B}$ $A = \frac{D \times B}{C}$ $C = \frac{D \times B}{A}$

The following table has been computed by these rules, and will show by a glance the relations between the size of disc and distance from screen for object glasses of all foci from four inches to 15 inches. The diameter of slide is taken as three inches, that being the usual opening of the mat.

Distance between Lantern and Screen.	FOCUS OF LENS.																					
	4in.		5in.		6in.		7in.		8in.		9in.		10in.		11in.		12in.		13in.		14in.		15in.	
	DIAMETER OF DISC.																					
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
10 feet.	7	6	6	0	5	0	4	3	3	9	3	4	3	0	2	9	2	6	2	4	2	2	2	0
11 ,,	8	3	6	7	5	6	4	9	4	2	3	8	3	4	3	0	2	9	2	6	2	4	2	2
12 ,,	9	0	7	2	6	0	5	2	4	6	4	0	3	7	3	3	3	0	2	9	2	7	2	5
13 ,,	9	9	7	10	6	6	5	7	4	11	4	4	3	11	3	7	3	3	3	0	2	9	2	7
14 ,,	10	6	8	5	7	0	6	0	5	3	4	8	4	2	3	10	3	7	3	3	3	0	2	9
15 ,,	11	3	9	0	7	6	6	5	5	8	5	0	4	6	4	1	3	9	3	6	3	3	3	0
20 ,,	15	0	12	0	10	0	8	7	7	6	6	8	6	0	5	6	5	0	4	7	4	3	4	0
25 ,,	18	9	15	0	12	6	10	9	9	4	8	4	7	6	6	10	6	3	5	0	5	4	5	0
30 ,,	22	6	18	0	15	0	12	10	11	3	10	0	9	0	8	2	7	6	6	11	6	5	6	0
35 ,,	26	3	21	0	17	6	15	0	13	1	11	8	10	6	9	6	8	9	8	1	7	6	7	0
40 ,,	30	0	24	0	20	0	17	2	15	0	13	4	12	0	10	10	10	0	9	2	8	6	8	0
45 ,,	33	9	27	0	22	6	19	3	16	10	15	0	13	6	12	3	11	3	10	4	9	8	9	0
50 ,,	37	6	30	0	25	0	21	5	18	9	16	8	15	0	13	8	12	6	11	6	10	9	10	0

EXAMPLES.—An 8in. focus lens at a distance of 35ft. will give a disc of 13ft. 1in. To produce a disc of 12ft. with a lens of 10in. focus, the lantern and screen must be separated by 40ft. To produce a disc of 15ft. at a distance of 45ft. will require a lens of 9in. focus.

Table for Enlargement and Reduction.

COMPUTED FOR CENTIMETRES OR INCHES.

Equivalent Focus of the Lens.	DISTANCES OF THE OBJECT AND THE GROUND GLASS SCREEN FROM THE CENTRE OF THE OBJECTIVE.																								
	1 *t.*	2 *t.*	3 *t.*	4 *t.*	5 *t.*	6 *t.*	7 *t.*	8 *t.*	9 *t.*	10 *t.*	11 *t*	12 *t.*	13 *t*	14 *t*	15 *t*	16 *t.*	17 *t.*	18 *t*	19 *t*	20 *t.*	21 *t*	22 *t*	23 *t*	24 *t*	25 *t.*
5..	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
	10	7·5	6·7	6·2	6	5·8	5·7	5·6	5·6	5·5	5·4	5·4	5·4	5·4	5·3	5·3	5·3	5·3	5·3	5·3	5·2	5·2	5·2	5·2	5·2
6..	12	18	24	30	36	42	48	54	60	66	72	78	84	90	92	102	108	114	120	126	132	138	144	150	156
	12	9	8	7·5	7·2	7	6·9	6·8	6·7	6·6	6·5	6·5	6·4	6·4	6·4	6·4	6·4	6·3	6·3	6·3	6·3	6·3	6·3	6·3	6·2
7..	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182
	14	10·5	9·3	8·8	8·4	8·2	8	7·9	7·8	7·7	7·6	7·6	7·5	7·5	7·5	7·4	7·	7·4	7·4	7·4	7·3	7·3	7·3	7·3	7·3
8..	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208
	16	12	10·7	10	9·6	9·3	9·1	9	8·8	8·8	8·7	8·7	8·6	8·6	8·5	8·5	8·5	8·4	8·4	8·4	8·4	8·4	8·3	8·3	8·3
9..	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234
	18	13·5	12	11·3	10·8	10·5	10·3	10·1	9·9	9·9	9·8	9·8	9·7	9·6	9·6	9·6	9·5	9·5	9·5	9·5	9·4	9·4	9·4	9·4	9·4
10..	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260
	20	15	13·3	12·5	12	11·7	11·4	11·3	11·1	11	10·9	10·8	10·8	10·7	10·7	10·6	10·6	10·6	10·5	10·5	10·5	10·5	10·4	10·4	10·4
11..	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275	286
	22	16·5	14·7	13·8	13·2	12·8	12·6	12·4	12·2	12·1	12	11·9	11·8	11·8	11·7	11·7	11·6	11·6	11·6	11·6	11·5	11·5	11·5	11·5	11·4
12..	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300	312
	24	18	16	15	14·4	14	13·7	13·5	13·3	13·2	13·1	13	12·9	12·9	12·8	12·7	12·7	12·7	12·6	12·6	12·6	12·5	12·5	12·5	12·5
13..	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338
	26	19·5	17·3	16·3	15·6	15·1	14·9	14·6	14·4	14·3	14·2	14·1	14	13·9	13·9	13·8	13·8	13·7	13·7	13·7	13·6	13·6	13·6	13·5	13·5
14..	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350	364
	28	21	18·7	17·5	16·8	16·3	16	15·8	15·6	15·4	15·3	15·2	15·1	15	14·9	14·9	14·8	14·8	14·7	14·7	14·7	14·6	14·6	14·6	14·6
15..	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390
	30	22·5	20	18·8	18	17·5	17·1	16·9	16·7	16·1	16·4	16·3	16·2	16·1	16	15·9	15·9	15·8	15·8	15·8	15·7	15·7	15·7	15·6	15·6

16..	32 32	48 24	64 21·3	80 20	96 19·2	112 18·7	128 18·3	144 18	160 17·8	176 17·6	192 17·5	208 17·3	224 17·2	240 17·1	256 17·1	272 16·9	288 16·9	304 16·9	320 16·8	336 16·8	352 16·8	368 16·7	384 16·7	400 16·7	416 16·6
17..	34 34	51 25·5	68 22·7	85 21·3	102 20·4	119 19·8	136 19·4	153 19·1	170 18·9	187 18·7	204 18·5	221 18·4	238 18·3	255 18·2	272 18·1	289 18·1	306 18	323 17·9	340 17·9	357 17·9	374 17·8	391 17·8	408 17·7	425 17·7	442 17·7
18..	36 36	54 27	72 24	90 22·5	108 21·6	126 21	144 20·6	162 20·3	180 20	198 19·8	216 19·6	234 19·5	252 19·4	270 19·3	288 19·2	306 19·1	324 19·1	342 19	360 18·9	378 18·9	396 18·8	414 18·8	432 18·8	450 18·8	468 18·7
19..	38 38	57 28·5	76 25·3	95 23·8	114 22·8	133 22·2	152 21·7	171 21·4	190 21·1	209 20·9	228 20·7	247 20·6	266 20·5	285 20·4	304 20·3	323 20·2	342 20·1	361 20·1	380 20	399 20	418 19·9	437 19·8	456 19·8	475 19·8	494 19·8
20..	40 40	60 30	80 26·6	100 25	120 24	140 23·3	160 22·9	180 22·5	200 22·2	220 22	240 21·8	260 21·7	280 21·5	300 21·4	320 21·3	340 21·3	360 21·2	380 21·2	400 21·1	420 21	440 21	460 20·9	480 20·9	500 20·8	520 20·8
21..	42 42	63 31·5	84 28	105 26·3	126 25·2	147 24·5	168 24	189 23·7	210 23·3	231 23·1	252 22·9	273 22·8	294 22·6	315 22·5	336 22·4	357 22·3	378 22·2	399 22·2	420 22·1	441 22·1	462 22	483 21·9	504 21·9	525 21·9	546 21·8
22..	44 44	66 33	88 29·3	110 27·5	132 26·4	154 25·7	176 25·1	198 24·8	220 24·4	242 24·2	264 24	286 23·8	308 23·7	330 23·6	352 23·5	374 23·4	396 23·2	418 23·2	440 23·2	462 23·1	484 23	506 23	528 23	550 22·9	572 22·1
23..	46 46	69 34·5	92 30·7	115 28·8	138 27·6	161 26·7	184 26·3	207 25·9	230 25·6	253 25·3	276 25·1	299 24·9	322 24·8	345 24·6	368 24·5	391 24·4	414 24·3	437 24·3	460 24·2	483 24·2	506 24·1	522 24	552 24	575 24	598 23·9
24..	48 48	72 36	96 32	120 30	144 28·8	168 28	192 27·4	216 27	240 26·7	264 26·4	288 26·2	312 26	336 25·8	360 25·7	384 25·6	408 25·5	432 25·4	456 25·3	480 25·3	504 25·2	528 25·1	552 25·1	576 25	600 25	624 25
25..	50 50	75 37·5	100 33·3	125 31·3	150 30	175 29·2	200 28·6	225 28·1	250 27·8	275 27·5	300 27·3	325 27·1	350 26·9	375 26·8	400 26·7	425 26·6	450 26·5	475 26·4	500 26·3	525 26·3	550 26·2	575 26·1	600 26·1	625 25	650 26

The use of the above table will best be explained by illustrations:

To enlarge six times with a lens of 15 centimeters (or inches) focal length. We find in the table under 6 *t.* and opposite the figures $\frac{105}{17{\cdot}5}$, hence the object must be 17·5, and the screen 105 centimeters (or inches) from the centre of the lens.

To reduce eight times with a lens of 19 centimeters (or inches) focus, the object must be 171 and the screen 21·4 centimeters (or inches) from centre of lens.

The table can be formulated thus: Where p = focal length of lens, a = distance from ground-glass to centre of lens and b = distance from object to centre of lens, then $\frac{1}{a} + \frac{1}{b} = \frac{1}{p}$

The Metric System of Weights and Measures.

The meter is a measure of length equal to 39·370 English or American inches, a standard of linear measure suppcsed to be the ten-millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of the meridian.

This system, formed on the meter as the unit of length, has four cther leading units, all connected with and dependent upon this. Hence, we have :

1. The meter, which is the unit of measures of length.

2. The are, which is the unit of surface, and is the square of the meter.

3. The litre, which is the unit of measures of capacity, and is the cube of a tenth part of the meter.

4. The stere, which is the unit of measures of solidity, having the capacity of a cubic meter.

5. The gram, which is the unit of measures of weight, is the weight of that quantity of distilled water at its maximum density which fills the cube of a hundredth part of the meter.

Each unit has its decimal multiples and sub-multiples, that is, weights and measures ten times larger, or ten times smaller, than the principal units. The prefixes denoting multiples are derived from the Greek, and are : Deka, ten ; hecto, hundred ; kilo, thousand ; and myria, ten thousand. Those denoting sub-multiples are taken from the Latin, and are : Deci, ten ; centi, hundred (as in centigram or centimeter) ; and milli, thousand.

The metric system has been adopted by many nations, the English excepted. In America its use has been made optional, but is legalised by Congress. All photographic formulæ received from the Continent of Europe express values and quantities with metrical weights and measures. To utilise them directly without translating into the expressions of the English system, the student is advised to procure gram weights and cubic centimeter graduates, and substitute them for those denoting quantities according to the old plan.

As an assistance to those who cannot acquire these aids, we annex tables, which convert grams and cubic centimeters into English grains, drams, and ounces sufficiently correct for practical purposes.

METRIC FLUID MEASURES.

The cubic centimeter, usually represented by "c.c.," is the unit of the metric measurement for liquids. It contains nearly 17 minims of water; in reality it contains 16·90 minims. The weight of this quantity of water is 1 gram. The following table will prove to be sufficiently accurate for photographic purposes :—

Metric System of Weights and Measures.

WEIGHTS.

Denominations and Values.			Equivalents in Use.
Names.	Number of Grams.	Weight of Volume of Water at its Maximum Density.	Avoirdupois Weight.
Millier or Tonneau	1,000,000	1 cubic meter.	2204·6 pounds.
Quintal	100,000	1 hectolitre.	220 46 pounds.
Myriagram	10,000	10 litres.	22 046 pounds.
Kilogram or Kilo	1,000	1 litre.	2·2046 pounds.
Hectogram	100	1 decilitre.	3·5274 ounces.
Dekogram	10	10 cubic centimeters.	·3527 ounce.
Gram	1	1 cubic centimeter.	15·432 grains.
Decigram	1-10	1-10th of a cubic centimeter.	1·5432 grains.
Centigram	1-100	10 cubic millimeters.	·1543 grain.
Milligram	1-1000	1 cubic millimeter.	·0154 grain.

MEASURES OF VOLUME.

Denominations and Values.			Equivalents in Use.	
Names.	No of Litres.	Cubic Measures.	Dry Measure.	Wine Measure.
Kilolitre or stere	1,000	1 cubic meter.	1·308 cubic yards.	264·17 gallons.
Hectolitre	100	1-10th cubic meter.	2 bu. and 3 35 pecks.	26·417 gallons.
Dekalitre	10	10 cubic decimeters.	9·08 quarts.	2·6417 gallons.
Litre	1	1 cubic decimeter.	·908 quart.	1 0567 quarts.
Decilitre	1-10	1-10th cubic decimeter.	6 1023 cubic inches.	·845 gill.
Centilitre	1-100	10 cubic centimeters.	·6102 cubic inch.	·3 8 fluid oz.
Millilitre	1-1000	1 cubic centimeter.	·061 cubic inch.	·27 fl. drm.

MEASURES OF LENGTH.

Denominations and Values.		Equivalents in Use.
Myriameter	10,000 meters.	6·2137 miles.
Kilometer	1,000 meters.	·62137 mile, or 3,280 ft. 10 ins.
Hectometer	100 meters.	328· feet and 1 inch.
Dekameter	10 meters.	393·7 inches.
Meter	1 meter.	39·37 inches.
Decimeter	1-10th of a meter.	3·937 inches.
Centimeter	1-100th of a meter.	·3937 inch.
Millimeter	1-1000th of a meter.	·0394 inch.

MEASURES OF SURFACE.

Denominations and Values.		Equivalents in Use.
Hectare	10,000 square meters.	2·471 acres.
Are	100 square meters.	119·6 square yards.
Centare	1 square meter.	1,550· square inches.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITRE, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent or 39·2 deg Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c., is generally used instead of millilitre, and cubic meter instead of kilolitre.

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE.

1	cubic centimetre	=	17	minims.						
2	cubic centimetres	=	34	,,						
3	,,	=	51	,,						
4	,,	=	68	,,	or	1	dram	8	minims.	
5	,,	=	85	,,	,,	1	,,	25	,,	
6	,,	=	102	,,	,,	1	,,	42	,,	
7	,,	=	119	,,	,,	1	,,	59	,,	
8	,,	=	136	,,	,,	2	drams	16	,,	
9	,,	=	153	,,	,,	2	,,	33	,,	
10	,,	=	170	,,	,,	2	,,	50	,,	
20	,,	=	340	,,	,,	5	,,	40	,,	
30	,,	=	510	,,	,,	1	ounce	0	dram	30 minims
40	,,	=	680	,,	,,	1	,,	3	drams	20 ,,
50	,,	=	850	,,	,,	1	,,	6	,,	10 ,,
60	,,	=	1020	,,	,,	2	ounces	1	,,	0 ,,
70	,,	=	1190	,,	,,	2	,,	3	,,	50 ,,
80	,,	=	1360	,,	,,	2	,,	6	,,	40 ,,
90	,,	=	1530	,,	,,	3	,,	1	,,	30 ,,
100	,,	=	1700	,,	,,	3	,,	4	,,	20 ,,
1000	,,	=	1 litre = 34 fluid ounces nearly, or $2\frac{1}{8}$ pints.							

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT.

Although a gram is equal to 15·4346 grains, the decimal is one which can never be used by photographers; hence in the following table it is assumed to be $15\frac{2}{5}$ grains, which is the nearest approach that can be made to *practical* accuracy:—

1	gram	=	$15\frac{2}{5}$	grains.						
2	grams	=	$30\frac{4}{5}$	,,						
3	,,	=	$46\frac{1}{5}$	,,						
4	,,	=	$61\frac{3}{5}$	,,	.....	or	1	dram	$1\frac{3}{5}$	grain.
5	,,	=	77	,,	.....	,,	1	,,	17	grains.
6	,,	=	$92\frac{2}{5}$	,,	.....	,,	1	,,	$32\frac{2}{5}$	,,
7	,,	=	$107\frac{1}{5}$	,,	.....	,,	1	,,	$47\frac{4}{5}$	,,
8	,,	=	$123\frac{1}{5}$	,,	.....	,,	2	drams	$3\frac{1}{5}$	,,
9	,,	=	$138\frac{3}{5}$	,,	.....	,,	2	,,	$18\frac{3}{5}$	,,
10	,,	=	154	,,	.....	,,	2	,,	34	,,
11	,,	=	$169\frac{2}{5}$	,,	.....	,,	2	,,	$49\frac{2}{5}$	,,
12	,,	=	$184\frac{4}{5}$	,,	.....	,,	3	,,	$4\frac{4}{5}$	,,
13	,,	=	$200\frac{1}{5}$	,,	.....	,,	3	,,	$20\frac{1}{5}$	,,
14	,,	=	$215\frac{3}{5}$	,,	.....	,,	3	,,	$35\frac{3}{5}$	,,
15	,,	=	231	,,	.....	,,	3	,,	51	,,
16	,,	=	$246\frac{2}{5}$	,,	.....	,,	4	,,	$6\frac{2}{5}$	,,
17	,,	=	$261\frac{1}{5}$	,,	.....	,,	4	,,	$21\frac{4}{5}$	,,
18	,,	=	$277\frac{1}{5}$	,,	.....	,,	4	,,	$37\frac{1}{5}$	,,
19	,,	=	$292\frac{3}{5}$	,,	.....	,,	4	,,	$52\frac{3}{5}$	,,
20	,,	=	308	,,	.....	,,	5	,,	8	,,
30	,,	=	462	,,	.....	,,	7	,,	42	,,
40	,,	=	616	,,	.....	,,	10	,,	16	,,
50	,,	=	770	,,	.....	,,	12	,,	50	,,
60	,,	=	924	,,	.....	,,	15	,,	24	,,
70	,,	=	1078	,,	.....	,,	17	,,	58	,,
80	,,	=	1232	,,	.....	,,	20	,,	32	,,
90	,,	=	1385	,,	.....	,,	23	,,	6	,,
100	,,	=	1540	,,	.....	,,	25	,,	40	,,
1000	,,	=	1 kilogram = 32 oz, 3 dr., 40 gr.							

Table of equivalent Quantities of some Chlorides Used in Photography.

CALCULATED FOR THE ANHYDROUS AND DRY SALTS.

By A. B. AUBERT, Professor of Chemistry, Maine State College, Orono, Me.

Sodium Chloride.	Potassium Chloride.	Ammonium Chloride.	Lithium Chloride.	Cadmium Chloride.
1	1·275	0·914	0·726	1·564
0·784	1	0·717	0·569	1·226
1·093	1·394	1	0 794	1·710
1·376	1·755	1·258	1	2·152
0·639	0·818	0·584	0·464	1

†EQUIVALENT QUANTITIES OF VARIOUS BROMIDES USED IN PHOTOGRAPHY.

Bromine.	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide + 4 Equi. Water.	Zinc Bromide.
1	1·225	1·488	1·287	2·150	1·406
0·816	1	1·214	1·055	1·754	1·147
0·672	0·823	1	0 865	1·445	0·945
0·777	0 952	1·156	1	1·671	1·092
0·465	0·570	0·692	0 599	1	0 654
0·711	0·871	1·058	0 915	1·529	1

† EQUIVALENT QUANTITIES OF VARIOUS IODIDES USED IN PHOTOGRAPHY.

Iodine.	Ammonium Iodide	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.	Zinc Iodide.
1	1·142	1·307	1·181	1·441	1·255
0·876	1	1·145	1·035	1·262	1·099
0·765	0·874	1	0·903	1·102	0·960
0·847	0·967	1·107	1	1·220	1·063
0·694	0·793	0·907	0 820	1	0·871
0·797	0·910	1·042	0·941	1·148	1

†EQUIVALENT QUANTITIES OF VARIOUS SILVER SALTS USED IN PHOTOGRAPHY.

Silver (Metallic).	Nitrate.	Chloride.	Bromide.	Iodide.
1	1·574	1·328	1·741	2·176
0·6353	1	0·844	1·106	1·382
0·7523	1·184	1	1·310	1·638
0 5744	0·904	0·763	1	1·250
0 4595	0·723	0·610	0 800	1

†EQUIVALENT QUANTITIES OF VARIOUS GOLD SALTS USED IN PHOTOGRAPHY.

Gold (Metallic).	Chloride.	Double Chloride of Gold and Potassium.	Double Chloride of Gold and Sodium.
1	1·542	2·1048	2·0229
0·6485	1	1·3645	1·3119
0·4751	0·7326	1	0·9611
0·4943	0·7623	1·0405	1

† Translated and partly recalculated from the "Agenda du Chimiste."

Table Showing comparative Value of Alkaline Carbonates in Developers.

O. G. MASON, M.D.

Commercial Name.	Chemical Symbol.	Molecular Weight.	The Commercial Salt contains of the pure Salt about	100 parts of 36 per cent. Acetic Acid Require for Saturation	Solubility in Water (approximate).
Soda, Caustic	NaHO	40	80 to 92 %	26·66 parts of 90 % Soda	1 part in 2
Sodium Carbonate Carbonate of Soda Sal Soda, Crystals	$Na_2CO_3.10H_2O$	286	96 to 98 %	89·38 „ 96% „	1 „ 2
The same, anhydrous or in dry powder	Na_2CO_3	106	About 98 to 99 %	89·38 of 98 to 99 % dry Sal. Soda.	1 „ 6
Sodium Bicarbonate Bicarbonate of Soda " Sesqui-carbonate of Soda "	$NaHCO_3$	84	98 to 100 %	50·91 of 99 % Bicarb. Soda.	1 „ 12

Equal work is done by 80 parts of Caustic Soda, 286 parts of Sal Soda (crystals), 106 parts of Sal Soda (dry), 168 parts of Bicarbonate of Soda. These quantities must be increased to make up for any impurity contained in the sample being used; for this purpose the usual percentage of impurity given in the above table may be assumed for all ordinary photographic uses.

Potassa (Caustic Potash)	KHO	56	80 to 95 %	37·33 parts of 90 % Potassa.	1 part in 1
Potassium Carbonate Carbonate of Potassa Sal Tartar Saleratus	$K_2CO_3.1\frac{1}{2}H_2O$	165	76 to 96 % Usually about 81 %	51·11 parts of 81 % Carb. Potassa.	1 „ 1
Potassium Carbonate, dry	K_2CO_3	140	About 95 %	122·74 parts of 95 % Carb. Potassa.	1 „ 1
Potassium Bicarbonate Bicarbonate of Potassa	$KHCO_3$	100	100 %	60 parts of 100 % Bicarb. Potassa.	1 „ 4

Equal work is done by 112 parts Caustic Potassa, 165 parts (about) Carbonate Potassa, 200 parts of Bicarbonate Potassa. These quantities must be increased in proportion to impurities, as noted in case of Soda. These two alkalies are interchangeable for doing the same amount of work when *pure*, and when the one named in a given formula cannot be obtained, the table may assist in choosing a substitute of proper strength and solubility.

Dry or anhydrous Carbonate of Potassium is not usually found in the market.

Elsden's Table of Poisons and Antidotes.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Vegetable Acids.	Oxalic Acid, including Potassium Oxalate.	1 dram is the smallest fatal dose known.	Hot, burning sensation in throat and stomach, vomiting, cramps, and numbness.	Chalk, whiting or magnesia, suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	Ammonia.	Vapour of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
	Potash.			
	Soda.			
Metallic Salts.	Mercuric Chloride.	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yoke of raw eggs with milk. In emergency flour paste may be used.
	Acetate of Lead.	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	Cyanide of Potassium.	*a.* Taken internally, 3 grs fatal.	Insensibility, slow, gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy. Cold effusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	Bichromate of Potassium	*a.* Taken internally.	Irritant pain in stomach, and vomiting.	Emetics and magnesia, or chalk.
		b. Applied to slight abrasions of the skin.	Produces troublesome sores and ulcers.	
	Nitrate of Silver.		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	Nitric Acid.	2 drams have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	Hydrochloric Acid.	½ ounce has caused death.		
	Sulphuric Acid.	1 dram has been fatal.		
	Acetic Acid, concentrated, has as powerful an effect as the mineral acids.			
	Iodine	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot and starch given freely.
	Ether.	When inhaled.	Effects similar to chloroform.	Cold effusion and artificial respiration.
	Pyrogallol.	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

Impurities in Photographic Chemicals and Tests for them.

Substance.	Impurities Possibly Present.	Tests.
Ammonia	Carbonic acid.	Renders lime-water milky.
	Dissolved solid matter.	Residue left on evaporation.
	Chlorides.	After acidulating with nitric acid, it gives a precipitate with silver nitrate, which, after washing, is readily soluble in ammonia, and re-precipitated by nitric acid.
	Sulphates.	After acidulating with nitric acid, it gives a precipitate with barium nitrate.
	Lime.	A white precipitate with oxalate of ammonium.
	Lead is often present, derived from the action upon flint glass bottles.	Black precipitate with sulphuretted hydrogen.
Nitric Acid.	Traces of sulphuric acid.	After dilution it gives a precipitate with barium nitrate.
	Chlorides.	After dilution it gives a precipitate with silver nitrate.
	Peroxide of nitrogen.	The acid is yellow.
	Iodine may be present if the acid be prepared from sodium nitrate.	After dilution and cooling it gives a blue colour with starch paste or mucilage.
Hydrochloric Acid.	Free chlorine.	Liberates iodine from solution of potassium iodide. See also chlorides, nitric acid.
	Sulphuric acid.	As above for nitric acid.
	Perchloride of iron.	Yellow colour. Brown precipitate with ammonia added till it smells slightly.
Hydrochloric Acid.	Arsenic.	Marsh's test.
	Some yellow samples contain no iron, but an organic salt, and give an alkaline ash on ignition of the residue after evaporation.	Reinsh's test; a small piece of copper foil becomes coated on boiling in dilute acid.
Sulphuric Acid.	Bisulphate of potassium.	Residue on evaporation.
	Sulphate of lead.	Milkiness in dilution.
		May be completely freed from lead by diluting with three or four times as much water, and allowing to settle.
	When sold as pure, it invariably contains a trace of iron. Common acid is also liable to contain arsenic, selenium, thallium, and many other substances.	No easy test can be given, as the substances are so numerous, some of them volatile, and most require separation from the acid before detection.
	Organic matter, as a piece of straw in a carboy of acid.	Gives a brown colour to the acid.
Acetic Acid.	Water.	Does not solidify when cooled to 17° C. (53° F.)
	Sulphurous and hydrochloric acids.	White precipitate with silver nitrate.
	Aldehyde, or volatile tarry matter.	Blackens in the light after adding silver nitrate.
	Organic sulphuric acid.	Smell of garlic.
Citric Acid.	Tartaric acid.	Strong solution of potassium acetate added to a strong solution of the acid will deposit white crystalline bitartrate.

Pyrogallic Acid.	Metagallic acid.	Black residue insoluble in water.
Silver Nitrate.	Free nitric acid.	Reddens litmus paper (neutral silver nitrate does not affect litmus).
Potassium Carbonate.	Chlorides and sulphates.	Same as for ammonia.
Potassium Iodide.	Potassium carbonate.	A strong solution is alkaline to test paper.
	Sulphates and chlorides.	Same as for ammonia.
	Potassium iodate.	A pretty strong solution becomes yellow from liberation of iodine on addition of dilute sulphuric acid, or better, a strong solution of citric acid.
Potassium Bromide.	Similar to potassium iodide.	See potassium iodide.
Sodium Carbonate.	Chlorides and sulphates.	Same as for ammonia.
Sodium Chloride.	Chloride of calcium.	Oxalate of ammonium (after addition of a little acetic acid) gives a milkiness or precipitate, indicating calcium ; filter this out, and add ammonia, chloride of ammonium, and phosphate of sodium (clear solutions). A precipitate indicates magnesium. Both the above cause dampness in wet weather.
	Chloride of magnesium.	
	Sodium sulphate.	As for sulphates in ammonia.
Potassium Cyanide.	Potassium carbonate nearly always present.	Effervescence with dilute acids, giving off a gas carbonic anhydride, which renders lime-water turbid.
Potassium Hydrate.		
Kaolin.	Chalk.	Effervescence with dilute acids.
Water.	Sulphates and chlorides.	Same as for ammonia
	Calcium carbonate, temporary hardness.	Deposited by boiling.
	Ammonia, almost always present in distilled and rain water.	Test as for calcium chloride, see sodium chloride.
		Brown colouration, or precipitate with Nessler's reagent.
Gelatine.	Alum.	Ash, sometimes as much as 10 per cent.
	Fatty matter.	Separated by precipitation with alcohol.
		Dissolved out by ether or benzine, and left as a residue on evaporation of the solvent.
Ammonium Bromide.	Potassium bromide, or other non-volatile bodies.	Leaves a residue when heated.
	Ammonium chloride.	Same as for chlorides in ammonia
Pyrogallic Acid.	Powdered glass.	Left behind on solution.
Potassium Iodide.	Potassium bromide.	The crystals of bromide are usually more transparent than those of iodide, but no reliance can be placed on this.
Silver Nitrate.	Potassium nitrate, sometimes present in the fused stick, not in the crystals.	Will not yield the full quantity of chloride on precipitation with HCl. Gives a purple colour to flame.
Calcium Chloride.	Calcium hydrate.	The clear filtered solution made with distilled water is alkaline to test paper, and gives a precipitate on breathing into it through a tube.
Pure Chemicals generally	Broken glass, bits of straw, wood, paper, &c.	These impurities either float or sink on the solution, and may easily be seen.

Table of Symbols, Molecular Weights and Solubilities of the Principal Chemicals used in Photography.

Abbreviations.—s., soluble; v.s., very soluble; sp.s., sparingly soluble; n.s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Acid, Acetic, Glacial	$HC_2H_3O_2$	60	s.	s.	s.
,, Boracic or Boric	H_3BO_3	62	30	3	1 in 30
,, Carbolic (Phenol)	C_6H_5OH	94	13	s.	s.
,, Chlorhydric (see Hydrochloric)					
,, Citric	$H_3C_6H_5O_7,H_2O$	210	·75	·5	10 in 15
,, Formic	H,CHO_2	46			
,, Gallic	$H_3C_7H_3O_5,H_2O$	170	100	3	1 in 8
,, Hydrobromic (Gaseous)	HBr	81			
,, Hydriodic	HI	128			
,, Hydrochloric	HCl	36·5			
,, Hydrocyanic	HCN	27			
,, Hydrosulphuric	H_2S	34			
,, Muriatic (see Hydrochloric)					
,, Nitric	HNO_3	63			
,, Nitrous	HNO_2	47			
,, Oxalic	$H_2C_2O_4,2H_2O$	126	8	1	n.s.
,, Pyrogallic (see Pyrogallol)					
,, Salicylic	$HC_7H_5O_3$	138	760	9	v.s. & ether
,, Sulphuric	H_2SO_4	98			
,, Sulphurous	H_2SO_3	82			also in ether
,, Tannic (Digallic Acid)	$C_{27}H_{22}O_{17}$	618	·8	·5	10 in 8
,, Tartaric	$H_2C_4H_4O_6$	150	·8	·5	1 in 5
Alcohol, Ethyl	C_2H_5OH	46			
,, Methyl (see Wood Alcohol)	CH_3OH	32			
Alum (see Potassium Aluminium Sulphate)					

Alum Chrome (see Potassium Chromic Sulph.)					
Ammonia, Gaseous	H_3N	17	v. s.		
Ammonium, Bichromate	$(NH_4)_2Cr_2O_7$	253	v. s.	v. s.	
,, Bromide	NH_4Br	98	1·5	1	1 in 13
,, Carbonate	$(NH_4)_2CO_3$	175	4	dec.	sp. s.
,, Chloride (Sal Ammoniac)	NH_4Cl	53·5	3	1	sp. s.
,, Fluoride	NH_4F	37	v. s.	v. s.	sp. s.
,, Iodide	NH_4I	145	1	·5	s.
,, Nitrate	NH_4NO_3	80	2	1	s.
,, Oxalate	$(NH_4)_2C_2O_4$	124	v. s.	v. s.	1·2
,, Sulphide	NH_4HS	51	v. s.	v. s.	1·2
,, Sulpho-cyanide	NN_4CNS	76	1	·5	s.
Barium, Bromide	$BaBr_2$	297	90	·75	s.
,, Chloride	$BaCl_2,2H_2O$	244	2·18	1 5	sp. s.
,, Iodide	BaI_2	391	·48	·35	v. s.
,, Peroxide	BaO_2	169	n. s.	n. s.	in hdchl. acid
Bicarbonate of Potass (see Potassium Bicarb.)					
,, ,, Soda (see Sodium Bicarbonate)					
Bichloride of Mercury (see Mercuric Chloride)					
Bromine	Br	79 8	s.	s.	s.
Borax (see Sodium Biborate)					
Cadmium, Bromide	$CdBr_2,4H_2O$	344	1·5	1	sp. s.
,, Chloride	$CdCl_2$	183	·71	·67	sp. s.
,, Iodide	CdI_2	366	1·5	1	1 in 2
Calcium, Bromide	$CaBr_2,4H_2O$	272	1	·75	s.
,, Carbonate (Chalk)	$CaCO_3$	100	n. s.	n. s.	n. s.
,, Chloride	$CaCl_2$	111	·75	·5	1 in 10
,, Hypochlorite (Chloride of Lime)	$CaCl_2O_2CaCl_2$	254	sp. s.	p.	dec.
,, Iodide	CaI_2	294	·75	·5	1 in 10
Calomel (see Mercurous Chloride)					
Carbonate of Ammonia (see Ammonium Carb.)					
,, ,, Potash (see Potassium Carbonate)					
,, ,, Soda (see Sodium Carbonate)					
Caustic Potash (see Potassium Hydrate)					
,, Soda (see Sodium Hydrate)					
Chalk (see Calcium Carbonate)					

Table of Symbols, Molecular Weights and Solubilities of the Principal Chemicals used in Photography.

Abbreviations.—s , soluble; v.s., very soluble; sp.s., sparingly soluble; n.s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water	Alcohol.
Chloride of Lime (see Calcium Hypochlorite)					
Chlorine	Cl	35·4	1:2·5	Volumes.	
Chrome Alum (see Potassium Chromic Sulph.)					
Copper Acetate (Verdegris)	$Cu(C_3H_3O_2)_2,H_2O$	200	14	5	1 in 14
,, Bromide	$CuBr_2$	223·4	1	·75	s.
,, Chloride	$CuCl_2,H_2O$	170·5	1	·75	v. s.
,, Sulphate (Blue Vitriol)	$CuSO_4,5H_2O$	249·2	3	1	n. s.
,, ,, and Ammmonia	$CuSO_4,4NH_3$	245·5	s.	v. s.	n. s.
Corrosive Sublimate (see Mercuric Chloride)					
Epsom Salts (see Magnesium Sulphate)					
Glaubers Salt (see Sodium Sulphate)					
Glycerine	$C_3H_5(HO)_3$	92	s.	s.	s.
Gold, Perchloride	$AuCl_3$	302·5	1	·75	also in ether
Green Vitriol (see Iron Sulphate)					
Hydrokinone	$C_6H_4(OH)_2$	110	3	s.	also in ether
Hydroxylamine Chloride	NH_3OHCl		v. s.	v. s.	n. s.
Iodine	I	126·6	sp. s.	sp. s.	v. s.
Iron, Ammonium Sulphate	$FeSO_4(NH_4)_2SO_4+6H_2O$	392	v. s.	dec.	n. s.
,, Chloride (Ferric)	Fe_2Cl_6	325	·75	·5	1 in 1
,, ,, (Ferrous)	$FeCl_2$	127	2	1	1 in 1
,, Citrate	$Fe_2(C_6H_5O_7)_2$	598	s.	s.	n. s.
,, Iodide	FeI_2	310	v. s.	v. s.	v. s.
,, Nitrate	$Fe(NO_3)_26H_2O$	288	v. s.	dec.	dec.
,, Oxalate (Ferric)	$Fe_2(C_2O_4)_3$	376	s.	s.	n. s.
,, Oxalate (Ferrous)	FeC_2O_4	144	in potassium oxal.		n. s.
,, Sulphate (Ferric)	$Fe_2(SO_4)_3$	400	.	dec.	s.

Iron, Sulphate (Ferrous)	$FeSO_4,7H_2O$	278	1·5	1	n. s.
Lead, Acetate (Sugar of Lead)	$Pb(C_2H_3O_2)_23H_2O$	379	2 5	2	1 in 12·5
,, Carbonate	$(PbCO_3)Pb(HO)_2$	774	n. s.	sp. s.	n. s.
,, Iodide	PbI_2	460	s.	s.	n. s.
,, Nitrate	$Pb(NO_3)_2$	331	7·7	7	s.
,, Oxide	PbO	223	n. s	n. s.	Alkalis
Lithium, Bromide	LiBr	87	·66	·5	v. s.
,, Chloride	LiCl	42·5	1·3	1	s.
,, Iodide	LiI	134	·61	·5	s.
Magnesium, Bromide	$MgBr_2$	184	1	·75	s.
,, Chloride	$MgCl_2$	95	2	1·5	s.
,, Iodide	MgI_2	278	1	·75	v. s.
,, Sulphate (Epsom Salts)	$MgSO_4,7H_2O$	246	1·3	1	sp. s.
Mercury, Chloride (Mercuric) (Corros. Subl.)	$HgCl_2$	271	19	3	5
,, ,, (Mercurous) (Calomel)	HgCl	235·5	n. s.	n s.	n. s.
,, Cyanide	$HgCy_2$	252	8	2	1 in 20
,, Iodide (Mercuric)	HgI_2	454	sp. s.	sp. s	sp. s.
,, ,, (Mercurous)	Hg_2I	327	n. s.	n. s.	n. s.
Phenol (see Carbolic Acid)					
Platinum Chloride	$PtCl_4$	339	1	·5	s.
Potassa (see Potassium Hydrate)					
Potassium, Aluminium Sulphate (Alum)	$Al_2(SO_4)_3,K_2SO_4,24H_2O$	948	10	8	n. s.
,, Bicarbonate	$KHCO_3$	100	3	2	n. s.
,, Bichromate	$K_2Cr_2O_7$	294·6	10	7	n. s.
,, Bromide	KBr	119·1	2	1	1 in 90
,, Carbonate	K_2CO_3	138·2	·75	·5	n. s.
,, Chlorate	$KClO_3$	122·4	16	2	n. s.
,, Chloride	KCl	74·5	3	2	sp. s.
,, Chromic Sulph. (Chrome Alum)	$Cr_2(SO_4)_3,K_2SO_4,24H_2O$	999	10	dec.	n. s.
,, Citrate	$K_3C_6H_5O_7H_2O$	324·3	·6	·3	n. s.
,, Cyanide	KCy	65	1	·5	sp. s.
,, Ferric Sulphate	$K_2SO_4Fe_2(SO_4)_3,24H_2O$	100·6	s.	s.	n. s.
,, Ferri-cyanide (Red Prussiate)	$K_6Fe_2C_{12}N_{12}$	658	2·5	1·2	n. s.
,, Ferro-cyanide (Yel. Prus.)	$K_4FeC_6N_6,3OH_2$	422	3	1	n. s.
,, Fluoride	KFl	94	v. s.	v. s.	v. s.
,, Hydrate	KOH	56·1	·5	·25	sp. s.

Table of Symbols, Molecular Weights and Solubilities of the Principal Chemicals used in Photography.

Abbreviations.—s., soluble; v.s., very soluble; sp.s., sparingly soluble; n.s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	cohol.
Potassium, Iodide	KI	166·1	·75	·5	1 in 16
,, Nitrate (see Saltpetre)	KNO	101·1	4	1	n. s.
,, Oxalate	$KC_2O_4H_2O$	235	3	2	sp. s.
,, Permanganate	$K_2Mn_2O_8$	314	16	10	n. s.
,, Platino-chloride	K_2PtCl_6	488·4	10	1	s.
,, Sulpho-cyanide	KCyS	97	2	1	sp.
Prussiate of Potash, red (see Potassium Ferricyanide)					
Prussiate of Potash, yellow (see Potassium Ferrocyanide)					
Pyrogallol (see Pyrogallic Acid)					
Sal ammoniac (see Ammonium Chloride)					
Sal soda (see Sodium Carbonate)					
Sal tartar (see Potassium Carbonate)					
Saleratus (see Potassium Bicarbonate)					
Salt, common (see Sodium Chloride)					
Saltpetre (see Potassium Nitrate)					
Saltpetre of Chili (see Sodium Nitrate)					
Sesqui-carbonate of Soda (see Sodium Carb.)					
Silver, Acetate	$AgC_2H_3O_2$	167	sp. s.	sp. s.	n. s.
,, Bromide	AgBr.	188	n. s.	n. s.	in HCl and HBr.
,, Carbonate	Ag_2CO_3	276	n. s.	n. s.	n. s.

Silver Chloride	$AgCl$	143·5	n. s.	n. s.	Ammonia, cyan. potass., hyposulphite of soda.
,, Citrate	$Ag_3C_6H_5O_7$	513	sp. s.	sp. s.	.....
,, Fluoride	$AgFl$	127	v. s.	v. s.	v. s.
,, Iodide	AgI	35	n. s.	n. s.	same as Chloride.
,, Nitrate	$AgNO_3$	170	1	5	sp. s.
,, Nitrite	$AgNO_2$	154	300	dec.	n. s.
,, Oxalate	$Ag_2C_2O_4$	304	sp. s.	s.	n. s.
,, Oxide	Ag_2O	232	n. s.	n. s.	n. s.
,, Sulphide	Ag_2S	248	n. s.	n. s.	n. s.
Soda, Caustic (see Sodium Hydrate)	.....	.....	.....	.....	.....
Sodium, Acetate	$NaC_2H_3O_2,6H_2O$	190	3	·66	n. s.
,, Biborate (Borax)	$Na_2B_4O_7,10H_2O$	382	12·5	2	n. s.
,, Bromide	$NaBr$	103	1·25	1	1·16
,, Bicarbonate	$NaHCO_3$	84	12	dec.	n. s.
,, Carbonate	$NA_2CO_3,10H_2O$	286	2	1	n. s.
,, Chloride	$NaCl$	58·5	2·75	2 75	n. s.
,, Citrate	$Na_3C_6H_5O_7$	258	1	·5	sp. s.
,, Hydrate	$NaHO$	40	1·5	·5	sp. s.
,, Hyposulphite	$Na_2S_2O_35H_2O$	248	1·5	1	sp. s.
,, Iodide	NaI	150	·5	·3	sp. s.
,, Nitrate (see Chili Saltpetre)	$NaNO_3$	85	1·36	1	1 in 7
,, Sulph-antimonite	$NaSbS_3$	241	s.	s.	n. s.
,, Sulphate	$Na_2SO_4,10H_2O$	322	2	4	s.
,, Sulphide	$Na_2S,9H_2O$	240	s.	s.	sp. s.
,, Sulphite	$Na_2SO_3,7H_2O$	252	4	2	sp. s.
,, Thiosulphate (see Hyposulphite)	.....	.....	.....	.....	.....
Strontium, Bromide	$SrBr_2,6H_2O$	355·5	1	·75	sp. s.
,, Chloride	$SrCl_2,6H_2O$	266·5	1·8	1	sp. s.
,, Nitrate	$Sr(NO_3)_2$	211·5	5	2	sp. s.
Sugar of Lead (see Lead Acetate)	.....	.....	.....	.....	.....
Sulphate Soda (see Sodium Sulphate)	.....	.....	.....	.....	.....

Table of Symbols, Molecular Weights and Solubilities of the Principal Chemicals used in Photography.

Abbreviations.—s., soluble; v.s., very soluble; sp.s., sparingly soluble; n.s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Mol. Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Tannin (see Tannic Acid)					
Thymol	$SnCl_4$	177	sp.		and in ether.
Tin Chloride (Stannic)	$C_6H_3(CH_3,C_3H_7)COO$	260	dec.	in much	water.
,, Chloride (Stannous)	$SnCl_2,2H_2O$	225	v. s.	v. s.	v. s.
Uranium, Bromide	$UBr_2,4H_2O$	352	1	·5	sp. s.
,, Nitrate	$UO_2(NO_3)_2,6H_2O$	384	·5	·25	v. s.
,, Sulphate	$UO_2(SO_4)3H_2O$	302	·5	·25	v. s.
Verdigris (see Copper Acetate)					
Vitriol, Blue (see Copper Sulphate)					
,, Green (see Iron Sulphate)					
,, White (see Zinc Sulphate)					
Washing Soda (see Sodium Carbonate)					
Wood Alcohol (see Alcohol Methyl.)					
Zinc, Bromide	$ZnBr_2$	225·2	1	·5	s.
,, Chloride	$ZnCl_2$	136·2	·33		s.
,, Iodide	ZnI_2	319·2	·33	dec.	v. s.
,, Nitrate	$Zn(NO_3)_2,6H_2O$	189	del.	del.	del.
,, Sulphate (White Vitriol)	$ZnSO_4,7H_2O$	287	.7	.5	n. s.

NELSON'S
Photographic Gelatine

AND

NELSON'S
SPECIAL X OPAQUE
GELATINE.

THE BEST

FOR

DRY-PLATE & OTHER WORK.

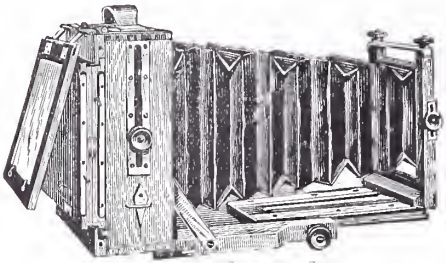
RETAIL FROM ALL DEALERS IN PHOTOGRAPHIC MATERIALS.
WHOLESALE FROM THE MANUFACTURERS—

GEO. NELSON, DALE & CO.,

LIMITED,

14, Dowgate Hill, LONDON, E.C.

Pearson & Denham's



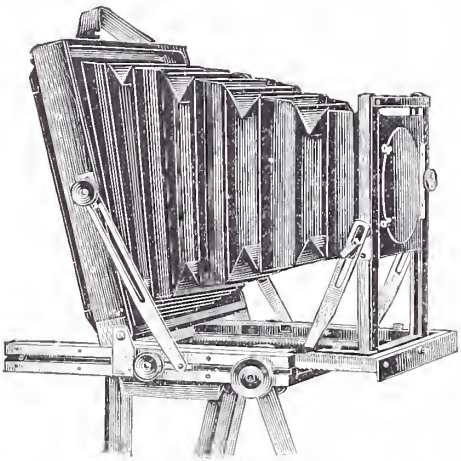
No. 1. SPECIA ITE.

SPECIAL PATTERNS OF CAMERAS.

The No. 2 SPECIALITE.

With long extension, swing back, and reversing focus screen. Beautifully finished, very rigid, and marvellously cheap.

½-pl., with three double slides, **£3 15**
No. 1 Spécialité **5 0**



THE COLLAPSIBLE.

The COLLAPSIBLE.

Very portable and highly finished. Folding swing front, rendered very firm by side stays. Travelling back for use with short focus lenses.

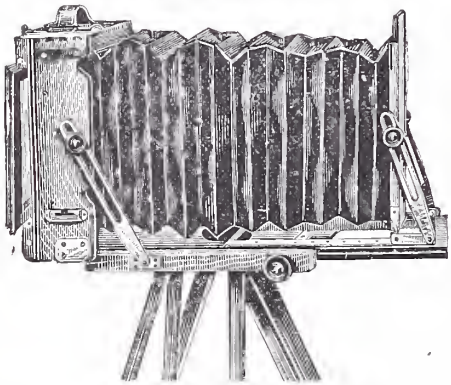
Price, including three hook slides
½-pl. **£6**

The STANDARD.

A high-class, substantially made camera, of the very best seasoned mahogany. The slight taper of the bellows renders them practically parallel. The firmly-stayed front slides to any part of the focussing tailboard without screws or nuts. Complete with spirit level, three slides,

Patent Turntable, and Three or Four-fold Tripod.

½-pl. ... ... **£7 7s.**



THE STANDARD.

THE IMPROVED CIRCUMBRA,

With circular bellows and patent **revolving** back. The camera for trying climates.

½-pl. ... ... **£7.**

PEARSON & DENHAM'S Special Rectilinear Lenses

Will compete with all others. Price, with patent diaphragm slot cover and stop holder,

¼-pl. **30/-**, ½ pl. **40/-**, ¼-pl. **60/-**

ALL NET PRICES ON THIS PAGE.

5, New Station St., LEEDS.

SECTION II.

TIPS FOR TYROS:

BEING

USEFUL HINTS

ON

PHOTOGRAPHIC PROCEDURE

FOR THE USE OF BEGINNERS.

A FEW OF

ADAMS & CO.'S SPECIALITIES

For full particulars, together with many other remarkable novelties, see our 1892 ANNUAL, published in June. 400 pages and 500 illustrations. The standard directory of everything appertaining to photography. Everything alphabetically arranged, and the whole work is clear, concise, and comprehensive.

ADAMS & CO.'S "CLUB" LANTERN SLIDE CAMERA.

It is made of polished mahogany, and has reversing front, which allows the view to be seen correctly on the ground glass when taking either horizontal or vertical views. Having horizontal and vertical movements, it renders it easy to correct any small error in the negative. The swing back is also another most important point, especially to hand camera workers, because it enables the operator to correct any lines that are out of the perpendicular. It is made so that it will take customers' own ½-plate or ¼-plate lens. Price—

½-plate with ½-plate Carrier, £3 3s.; ½-plate with ½ & ¼-plate Carriers, £3 15s.; 12 x 10 with Carriers, £4 15s. Cash discount, 5 per cent. Or fitted with R.R. Lens, 20/- each extra.

ADAMS & CO.'S PANTOSCOPE

For viewing lantern slides and giving them a stereoscopic effect. This is fitted with a single lens, with new sliding carrier for slides. Price 15/- Post free, 15/6.

Adams & Co.'s "Frame" Mounts.

For holding and exhibiting photos, and are intended for the purpose of using up waste negatives by mounting, either by optical contact or merely placing the prints behind the glass.

They consist of an imitation leather frame, with the edges glued for folding over, and are supplied with cardboard backs, fitted with rings suitable for hanging either landscape or portrait pictures. They have the appearance of real leather, and are of different shapes, and can be made in all sizes.

¼ and ½-plate, 1s. per packet. The ¼-plate packet contains 12 complete frames of three shapes, and of six different patterns.

The ½-plate 8 frame ditto Postage 3d. extra.

¼-plate 1/6 per ½-dozen. ⅛-plate 2/6 per ½-dozen.

DEVELOPING SINKS.

Several patterns of entirely new designs. All those fitting up their own dark rooms should see them. Prices from 50/- to 115/-

"CLUB" AND "CHALLENGE" LENSES.

Best quality lenses at popular prices.

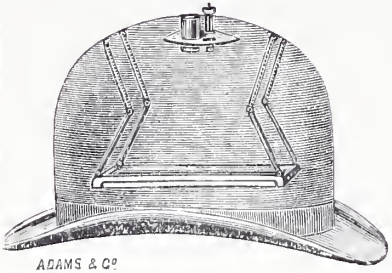
EVERY CONCEIVABLE PHOTO REQUISITE.

We hold the most varied photographic stock in the United Kingdom. Orders by post sent off same day as received.



ADAMS & CO.'S

'HAT' DETECTIVE CAMERA



ADAMS & Co



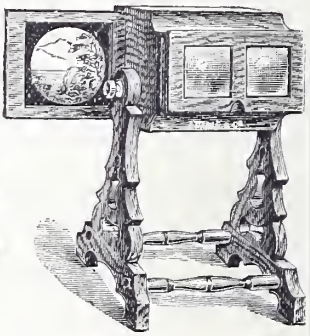
ADAMS & Co

THIS folds inside the same as an ordinary opera hat, and the lens can be removed in a moment, it simply fitting in with a bayonet joint. It takes pictures $4\frac{1}{4}$ x $3\frac{1}{4}$, and is fitted with a best quality Rectilinear Lens working at f/11. The shutter works in the diaphragm slot and time as well as instantaneous exposures may be given. A focussing screen is also supplied. This is really a good instrument, and is not to be classed with the small postage stamp so called cameras, like the scarf, purse, and button-hole. By taking $4\frac{1}{4}$ x $3\frac{1}{4}$ it becomes a useful instrument. They are sent out all ready for fitting, or we fit them free of expense if hat is sent.

Price £3 3s. net, with two Slides. Extra Slides, 4/- each.

ADAMS & CO.'S

BINOCULAR PANTOSCOPE



For the purpose of effectively viewing Lantern Slides.

THIS **does not** require a Stereoscopic Slide, but merely the ordinary Lantern Slide. It is fitted with two very powerful Prismatic Lenses, which magnify **nearly double.** Instruments with only one eyepiece become tiring if a number of slides are looked at, but this is overcome with the Binocular Pantoscope; also by looking with both eyes double the light is obtained. The instrument can be focussed for different sights. For the easy insertion of slides, a sliding carrier is added, which also ermits of the exact registering of the slides.

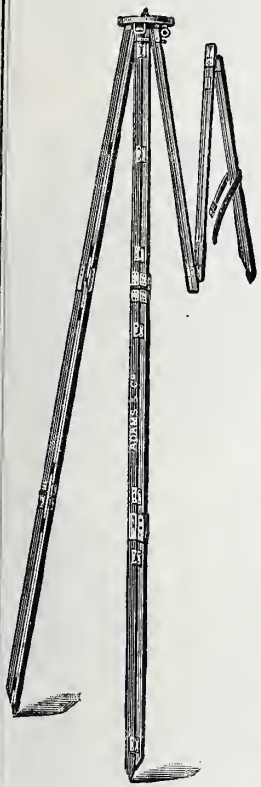
Handsomely finished in polished mahogany, and sent out carefully packed in box complete.

The No. 1 is arranged for $\frac{1}{2}$-pl. prints as well as Lantern Slides, and has a raising mirror, the same as the ordinary Stereoscope. It is also so constructed as to take the **Chromoscope,** an instrument which gives a variety of graduated tinted effects to the slides, and which is extremely pretty and effective. Sunrise, sunset, and a variety of cloud and sea effects are also obtained.

Photography, Mar. 17th, 1892, says:—"From Messrs. Adams & Co. comes the latest thing in Pantoscopes, which is a vast improvement on anything yet placed on the market. The instrument is exceedingly well made; whilst the price is remarkably reasonable."

No. 1, 31/6 net, post free 32/6; with Detachable Chromoscope, £2 2s. net.

No. 2, 25/- net (as Illustration), **post free 26/-**



ADAMS & CO.'S 'LIGHTNING' TRIPOD.

IT ERECTS ITSELF!!

TERRIFIC SUCCESS!!



Is handsomely made in polished walnut, with brass and steel fittings, and is entirely free from anything that can possibly get out of order. There is not a single screw or catch of any kind that requires adjustment, and it literally erects itself **instantaneously,** and is closed in **five seconds.**

DIRECTIONS.—Take hold of the head and hold the stand at arm's length, when it will immediately fall into position.

Height 4ft. 5in.; closed 19in.; weight 2¼lbs.

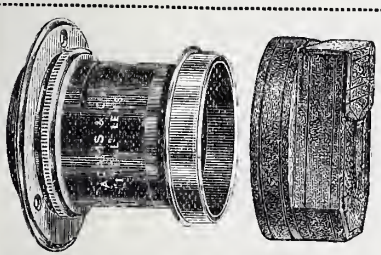
Price 21/- nett.

Postage 6d.

Taking all cameras up to and including ½-plate.
Larger size for ½-plate, **27/6.**

The *Amateur Photographer* of August 7th says:—"Well deserves the name given it, for with the unbuttoning of a strap, shown in the illustration, three legs unfold and give us a most rigid Tripod. Is sold for 21/-, and is the cheapest Tripod in the market, taking into account the extreme portability and rigidity."

Photographic Scraps says:—"A rigidity that is not as a rule possessed by the ordinary Stand, which needs unfolding, setting, and screwing. This new stand is one of the few *real* novelties introduced, and well deserves every commendation that we can give it."



The "Ideal"

DETECTIVE LENS.

We can supply the first-class Lens, as fitted to our "Ideal," separately. It is of 5½in. equiv. focus, and works at *f*/8. Complete with stops, **35/-**; with Iris diaphragms, **45/-**
Less 10 per cent. discount.

ADAMS & Co 81, ALDERSGATE St. E.C. (FACING THE STATION) & 26, CHARING CROSS Rd. W.C. (ADJOINING THE CAMERA CLUB) (CHARING CROSS END) **LONDON**

SOMETHING QUITE NEW FOR 1892.

Full particulars and illustrations upon application.

ADAMS & CO.'S

"VESTA" CAMERA.

A Folding Hand Camera for 4¼ × 3¼ plates, that may be carried in the pocket, complete with Dark Slide Lens, Shutter, Focussing Screen, and Finder.

THIS Camera, although so small that it may be carried in the pocket, contains all essentials requisite for Hand Camera work. It is fitted with Wray's Lens, and will focus from four yards to any distance. The ground glass is always in position, and by removing the Dark Slide may be used for focussing immediately; but, if it is not required to be used in this way, the focus is marked on a scale that can be readily seen. It can be used on a Tripod in the usual manner. The Shutter is provided with Newman's patent pneumatic regulation, and open or cap exposures may be given at will when folded for the pocket. It contains everything *in situ*, including a Dark Slide. It can be set up in a few seconds, and is then ready for use. It has a Swing-back for upright pictures, therefore architectural subjects may be photographed without distortion. The ground glass being always in position, it is a great advance on Pocket Cameras as hitherto constructed, and it is the only one fitted with Finder and having a Shutte constructed to give automatic exposures as slow as ¼-second.

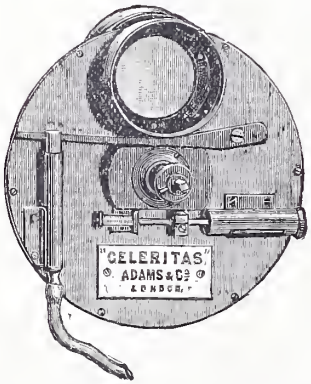
Complete, in Case, with 3 Double Dark Slides, **£7 7s.** nett.

NEWMAN'S

'CELERITAS' SHUTTER.

ADAMS & CO. (Sole Agents).

For Taking Sports, Horses Racing, Steeplechasing, &c., &c. It is ABSOLUTELY the Quickest Shutter on the Market.



AS will be seen by illustration, this is circular in construction, and works between the lenses. It is necessarily well made in all points to stand the strain consequent upon so high a speed being obtained. On a one-inch opening an exposure of $\frac{1}{500}$ of a second can be made, giving the full value of the aperture. On smaller apertures greater speeds may be obtained, and *vice versâ*. For instance, on a half-inch the speed would be $\frac{1}{1000}$. These figures may be relied upon, as each shutter is scientifically tested and is accurately marked.

Although working at so high a speed, no vibration whatever is produced. The stopping mechanism consists of a pneumatic buffer, which is a development of Mr. Newman's pneumatic regulator. A new mount is supplied with each, and it is only necessary to screw in the lenses, and a slot is provided for the insertion of diaphragm. Iris diaphragms can be made, if preferred, at a slight increase in price.

PRICE **£3 10s.** nett. ½-plate, to 12 × 10, **£4** nett

ADAMS & Co 81 ALDERSGATE S.E.C. (FACING THE STATION) & AT 26 CHARING CROSS R.S.W.C. (ADJOINING THE CAMERA CLUB) (CHARING CROSS END) LONDON

The "OTTO"

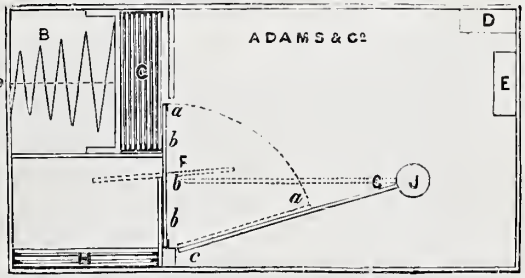


TEAR'S & ADAMS'

Patent.

50s.

NET.



UP to the present time there has heen no cheap Automatic Camera permitting of instantaneous changing, and that takes 12 plates. We therefore place the **"Otto"** upon the market, assuring the public that it is really a first-class and reliable article, and far better than numbers of cameras sold at double the price. As is well-known, we possess a world-wide reputation for high-class Hand Cameras, and we introduce the **"Otto"** to enable those who do not care to go in for our better instruments to become possessors of a camera, which, whilst inexpensive, shall he useful and reliable, and as all round effective as such an extremely low price will permit.

The following are full particulars concerning same:—

It takes 12 plates, $4\frac{1}{4} \times 3\frac{1}{4}$ in sheaths, and measures outside 11 x 5 x 6, and weighs, complete *with* the 12 plates, under 4lbs. Is supplied with two finders, one showing the vertical and one the horizontal picture, a new self-capping shutter for both time and instantaneous exposures, and a really first-class landscape lens. Is covered with black imitation morocco leather, and made of well-seasoned mahogany throughout.

Fig. 2 shows a section of the Camera. **B** is spiral spring pushing plates **(C)** forward, and keeping them in focus. **H** are exposed plates. **D** is finder, and **E** lens and shutter. To change a plate, slightly pull **A,** when the front one will fall upon plane **G.** Then turn knob **J,** and it will slide into exposed chamber **H.** The dotted lines show the action, the plate falling face downwards. As will be plainly seen, the movement is so entirely simple as to prevent a hitch of any kind. Twelve plates can with absolute certainty be changed in about as many seconds. There are no complications or mechanisms of any kind whatsoever.

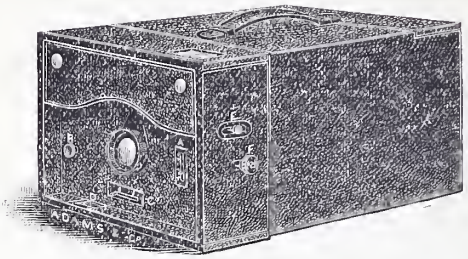
50/- nett. Post free per return post, carefully packed, 51/6. **50/- nett.**

ADAMS & Co 81, ALDERSGATE St. E.C. (FACING THE STATION) & AT 26 CHARING CROSS S.W. (ADJOINING THE CAMERA CLUB) (CHARING CROSS END.) **LONDON**

THE 'ADAMS' HAND CAMERA.

(Newman's and Adams's Patents.)

This Camera has been entirely re-designed for the season 1892, and is now a Perfect Instrument in every detail.



Takes Plates, Roll-holder, or Cut Films, is fitted with a Focussing Screen for use as an ordinary Camera, and weighs complete, with Changing-box, 4½lbs. only.

THE HIGHEST CLASS & MOST PERFECT HAND CAMERA IT IS POSSIBLE TO BUY.

LENS.—Ross' 5×4 Rapid Symmetrical of 5¾in. equivalent focus, which is specially selected by Messrs. Ross & Co. for our purpose. When fitted on the "Adams" Camera it is placed on a special mount, containing Iris Diaphragm, in connection with the Shutter, but the original lens-tube, flange, and stops are supplied, so that it may be used on any other camera.

SHUTTER.—It is fitted with Newman's latest Patent Pneumatic Regulation, thus any exposure between $\frac{1}{100}$ and ½ sec. may be given with certainty by merely setting the Indicator at the required speed. Another advantage is that it is entirely unaffected by damp, heat or other climatic influences. It works in the diaphragm slot, and opens from and closes to the centre, thus giving 80 per cent. of light. A Shutter going *across* gives 50 per cent only. Thus a much quicker exposure may be given, and the Plate will be as well exposed as when a much slower exposure is made in an ordinary camera.

FILMS.—The Camera is so constructed as to allow of the fitting of an Eastman Roll-holder without alteration except to the Roll-holder itself. The Sheaths in the Changing-box are so designed that Cut Films or Plates may be carried at will. During exposure the Films are held on four sides.

FOCUSSING.—The Camera is made to focus from two yards to infinity, and is accurately marked to various distances between, and can be set to work as a fixed focus Camera if desired. A focussing screen is supplied, so that it may be fixed on to a stand, and thus used as an ordinary Camera, and is so arranged as to entirely dispense with a focussing cloth.

CHANGING PLATES.—A small Changing-box, which holds twelve plates, is contained in the Camera, and when a plate has to be changed it is merely necessary to pull a small lever, which raises the plate about one inch in the Changing-bag; this is then raised and placed at the front of the series of plates. An indicator shows number of plates exposed. The Box itself is detachable, and when the dozen plates are exposed it can be removed and another Box substituted in the open field.

FINDERS.—There are two Finders, one showing the horizontal picture and the other vertical.

GENERAL REMARKS.—Every small point has been carefully considered in the construction of this Camera. The Sheaths are Newman and Adams patent, which bring either Plates or Films accurately into focus without regard to the thickness. A Tablet is provided for making notes of the exposures. It is fitted with two bushes and screw for use on a tripod stand. Exposures may be made by means of a cap when desired. It is covered in real morocco leather, is exquisitely finished, and every part is of the very highest quality and workmanship.

The complete Instrument is enclosed in a handsome cloth-lined, solid leather case, with nickel spring lock and sling strap.

Price for ¼-plate, complete in Case, with one Changing-box,

FIFTEEN GUINEAS NETT CASH.

Extra Changing-boxes, **45/-** nett. Roll-holder, including Fitting, **47/6** nett.

5 × 4 ditto, **EIGHTEEN GUINEAS NETT CASH.**

Extra Changing-boxes, **55/-** nett. Roll-holder, including Fitting, **52/6** nett.

For those requiring a Tripod Stand we can recommend our "Lightning," as described on page 3, as being rigid and easy of erection.

ADAMS & CO.'S "CLUB" CAMERA.

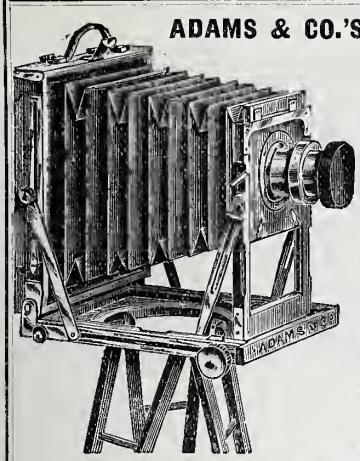


FIG. 80

Absolutely the Lightest Made.

The Perfection of Cameras.

A New, Exceedingly Light and Portable Tourist's Camera.

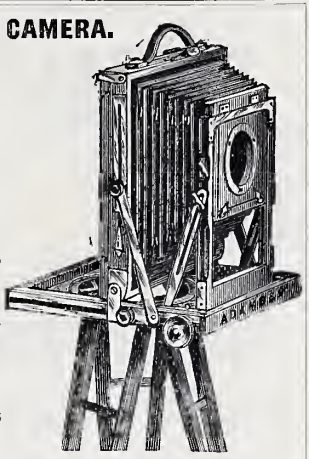


FIG. 81.

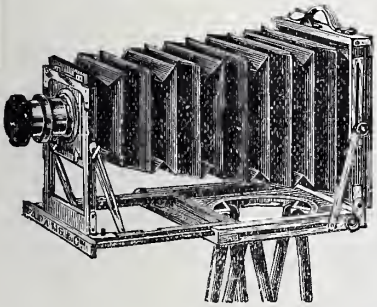


FIG. 82.

Made of very best quality & thoroughly well-seasoned Spanish mahogany, and is an exquisite piece of apparatus in every particular.



FIG. 83.

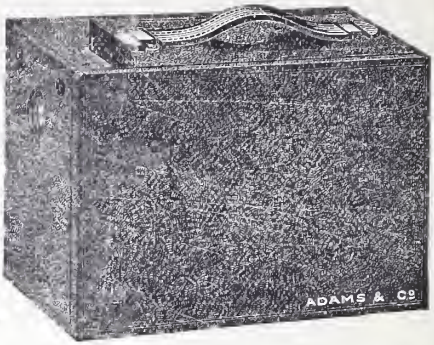
The *Amateur Photographer* of April 3rd, 1891, says:—

"The force of invention can surely go very little further, for in the 'Club' Camera we have as light and as elegant an instrument as anyone can wish to handle. The one we examined, half-plate size, is the lightest and most compact Camera we have yet seen, and is very easily and quickly set up, and is provided with an arrangement so that wide-angle or long-focus lenses can be used, and a turntable with special cam lever locking arrangement which prevents any shifting when once the subject is arranged on the focussing screen. At the same time, the instrument is very firm and rigid, and is of first-class wood and workmanship, and we noted also that nearly all the working parts were of brass and metal worked on metal, thus ensuring perfect firmness and holding power."

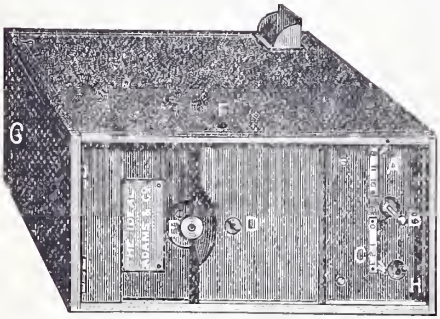
Is square, has reversing back, rising and falling front, and double-swing; back of Camera also slides up to front, so as to be able to use wide-angle lenses, is long focus, and thoroughly strong and rigid, and suitable for all work. The dark-slides are fitted with patent light-tight joints, and stop springs are also fitted to the shutters. It has a revolving turntable, which can be clamped at any point, and to which the three-fold stand supplied can be affixed in a thoroughly simple manner. The following prices are subject to 5 per cent. discount when cash accompanies order, and include three double backs, and extra front, a three-fold tripod, and revolving turntable complete.

Size in Inches.	Prices.	Extra Double Dark Slides.	Brass Binding.	Size of Camera.	Weight of Cameras. lbs.	oz.	Extends Inches.	Extra Cost for Aluminium Fittings, saving about 1-fourth the weight.
6½ x 4¾	£10 0 0	£0 19 0	£1 10 0	8½ x 8½ x 1¾	3	0	16	£3 0 0
7½ x 5	11 0 0	1 2 6	1 10 0	9½ x 9¼ x 1¾	3	12	17½	3 0 0
8½ x 6½	11 15 0	1 4 0	1 15 0	10½ x 10¾ x 1¾	4	6	19	3 10 0
10 x 8	13 10 0	1 10 6	2 0 0	12½ x 12¾ x 2¾	5	10	22	4 0 0
12 x 10	10 15 0	1 16 0	2 10 0	14½ x 14¾ x 2¾	8	12	27	5 0 0
15 x 12	21 0 0	2 7 6	3 0 0	17½ x 17½ x 3	14	0	33	6 0 0
18 x 16	30 0 0	3 6 6		21 x 21 x 3	19	0	37	
20 x 18	37 0 0	4 5 6		24 x 24 x 3¾	26	0	43	
24 x 20	42 0 0	5 5 0		28½ x 28½ x 4¾	33	0	50	

'IDEAL' Hand Camera.



THE success of "The Ideal" in the recent great Hand Camera Competition organised by *Photography* is simply unparalleled in any photographic competition whatever. It was open to the whole world, and over 800 pictures were sent in; and, although fifty-three different Cameras competed, "The Ideal" was the only Camera awarded a Silver Medal, this being the highest possible award. No less than Six First Position Medals were also awarded "The Ideal" in the nine classes. The next highest position was obtained with a Camera having a record of Two Only. In one of the most difficult classes no medal was awarded, but the judges decided that the work sent in by "The Ideal" was the best of the lot. Although only Ten "Ideals" competed, Six obtained First Position Medals, this undoubtedly proving that it is by far the most reliable Hand Camera made.



Size.—Takes 12 plates $4\frac{1}{4}$ x $3\frac{1}{4}$, vertical or horizontal. Measures outside 8 x $4\frac{3}{4}$ x $8\frac{3}{4}$in., and weighs 4 to $4\frac{1}{2}$lbs. filled complete with sheaths. Filled with 12 plates, 5 to $5\frac{1}{2}$lbs. only.

Changing Plates.—This is effected by pulling out knob E, and returning same to its original position. The same movement also registers the number of plates exposed.

Lens.—It is fitted with our "Ideal" Rapid Rectilinear Detective Lens, and works to F/8. Two smaller apertures are also provided, and the diaphragms may be changed by moving lever (A) underneath.

Shutter.—This (B) is an entirely new Shutter, which has been specially designed for us by Mr. Newman, and is fitted with his latest Patent Pneumatic Regulation. It is entirely unaffected by damp, heat or other climatic influences; and the fact also of the whole Shutter being made entirely of suitable metal makes it the only reliable and effective one for hot and tropical climates. Another distinct advantage, and one that will be appreciated by every Hand Camera worker, is that the Shutter is always "ever set." It works in the diaphragm slot, and has a self-capping device which works automatically, and has, which is most important, a DIRECT movement across the lens.

Focussing.—No. 1 is fixed focus. No. 2 is made to focus at various distances, down to six feet.

Finders.—One for horizontal, and one for vertical pictures. Hoods are also fitted, which, when not in use, fold in flush.

General Remarks.—The Camera is made throughout of the finest seasoned wood, and guaranteed to be light-tight in every part, and is of the very best workmanship. It can be held in the hand or fitted to a tripod.

Stiff Waterproof Cases, lined with baize, and with shoulder straps, and fitted with lock and key, **15/-** each. Best quality, Solid Leather, ditto, **21/-**

Waterproof Overalls, which can be taken off and carried in pockets, **4/6** each.

No. 1. PRICE £7, STRICTLY NETT CASH.

18 Plates .. .. **£8 0 0** Nett.

No. 2. FITTED WITH WRAY LENS, AND MADE TO FOCUS.

12 Plates .. .. **£8 10 0** } Nett
18 Plates .. .. **9 10 0** } Cash.

SECTION II.

TIPS FOR TYROS:

BEING USEFUL HINTS ON PHOTOGRAPHIC PROCEDURE FOR THE USE OF BEGINNERS.

Preparatory Tips for Touring Tyros.

Use a Broad Strap or Band for the Camera Case.—The usual narrow strap causes not only inconvenience but actual pain when the case is heavy, and it is wonderful the difference in comfort that a broad strap gives. A good material for these bands is that which the fair sex use for belts, and is a sort of webbing, and can be obtained of any suitable colour. A good plan is to have the band entirely detachable from the camera case, and this is easily managed by having two rings attached at either upper end of the camera case, and a spring hook at each end of the band; thus it can be detached in a second. Another point is to have the band just the right length, as when too short the effect is partial asphyxiation, and when too long the effect is wobbly to the wearer and ludicrous to the spectator.

Try your Plate before going on Tour.—Many a beginner comes back from his tour jubilant at having exposed *x* dozen, "don't cher kno," and when he comes to develop them finds that the exposures are all wrong in one or other direction. Ergo, before getting your gross or so, buy a dozen of each different brand, and try each brand on, say, an interior (your own drawing-room does well) and a landscape (your garden, &c.) Carefully note the exposures given, and the experiences in development. Then having selected the two rapidities you find best, order in your thousands and go and be happy. Only this last year in Wales on two occasions we heard the following sort of thing: "Well, I don't know whether this will be anything; you see I haven't tried these plates before; the man in the shop said they were very rapid," &c., &c.

Packing the Camera Case.—Have a method in doing this and stick to it, so that a glance at the interior of the case before leaving home will show if all necessaries are there. Moreover, make a list of what you require

when away from home, and affix it to the top of the case inside. For instance :

Camera.	Diaphragms.
x Slides.	Level.
x Lenses.	Focussing cloth.
Shutter.	Spare ground glass.
Tripod top and screw.	Ball of string.
Notebook.	View-finder.

If this is then pasted inside and gone through before leaving home, many disappointments will be avoided. Nothing is more conducive to the use of low "patois" than to find the tripod screw or the diaphragm case or the particular lens has been left at home. Again, always take care to load your slides the night before, and note the plates used, more especially if you generally take two or more rapidities with you.

In fact, you can make up the notebook ready for your exposures thus if you take three double backs :

1. Bromide & Co.'s Slow Landscape.
2. ,, ,,
3. Greenfog's Extra Sensitive.
4. ,, ,,
5. Spottiphilm's Ultra Rapid.
6. ,, ,,

And by comparing your entries with the slides when taking the view, interior, &c., you will have the pleasure of knowing that your long exposure was *not* on the most rapid plate you had with you. Lastly, if you lock your case, &c., don't forget your keys. This of course applies all the more strongly to hand cameras with dark slides which can be locked up inside, or where a cover over the changing bag locks. We always carry the key of our hand camera on our watch chain.

Points about Lenses worthy of Note.—It is always well to know your tools, and often when you know of the existence of a fault you can take measures to avoid its influence on the resulting negative. The first point to note is whether

The hood cuts off a part of the field of view. Really, practically speaking, the hoods as generally fitted to lenses are no earthly good. We believe the makers' idea—if they have one—is that it shields the lens from stray light, but if that is the idea why not make the hood some three or four times the depth it generally is. Personally speaking, we have our shutters fitted to the mount direct, after unscrewing the hood, and this is economical in more ways than one, as it saves bulk and saves money in the direction of getting smaller shutters. We only use the hood because the cap fits it. Now, to return to our heading, we must test if the hood interferes with our field of view. To do this, focus a somewhat distant view with open aperture. Then remove the ground glass screen, and place the eye—your own preferably—in about the same place as before occupied by the screen and at one corner. Now look through the lens, and if the light appears a perfect circle all well and good, and the hood is all right. If, however, the appearance is not circular, but made up of two intersecting circles, the hood prevents the lens acting

properly at open aperture. Insert the largest stop you have and examine again; if the light is not circular, insert the next smaller, and so on. Note the size of the stop which first makes the light a perfect circle. This will be the largest sized aperture at which the lens will act properly. Of course this is always supposing the hood will not unscrew. If it will, our advice is, take it off and do not use it, but have caps made to fit the mount.

The covering power of a lens should be ascertained, for many lenses sold to cover, say, 7 × 5 will not, unless much stopped down, cover a ½ plate. To test covering power all that is required is to either adjust the lens to a camera having a larger focussing screen than the lens is supposed to cover, thus a 7 × 5 to a ¼-plate camera; or, better still, fix the lens in a hole in the shutter of the dark room and focus on a large sheet of puttied or ground glass moved backwards and forwards for the purpose. Now observe the diameter of the circle of distinctness first with open aperture, and then with the various stops. The diameter *with open aperture* should be

5½	inches	for a quarter plate
6½	,,	for 5 × 4
8¼	,,	for ½-plate
8¾	,,	for 7 × 5
11	,,	for ¼-plate.

Of course the screen must be moved to get the various parts of the circle distinct, but beyond a certain point no focus can be obtained, and it is this limit that must be observed.

Spherical aberration is a rather serious fault, as it impairs the sharpness of the image, and in some cases even gives an impression of great halation on the plate, whereas it is the lens which is in fault. To test for this is a simple matter. Focus a candle flame by means of a magnifying glass on the ground glass. Now examine the image for a sort of glow or halo all round the bright portion; also note whether the image is quite sharp. Of course this must be tried without any stop in the lens, and if the fault exists change the lens if possible. Another troublesome fault is what is called

A ghost, or false image, and this is tested in nearly the same manner as for spherical aberration. When the flame is focussed in the centre of the screen, turn the camera slowly so that the image moves to one side, and note carefully whether another image moves towards the other side. Of course it may not be in actual sharp focus, but it can be focussed if present, and appears the reverse way to the real image on the screen, *i.e.*, it is erect. It may sometimes be partially cured by the optician, but is apt to fog the plate when bright objects are on one side and dark on the other.

A flare spot is a serious fault, and unless the optician, by altering the position of the diaphragms, can cure it, the lens should be discarded. It assumes the form of a spot of light (really the reflection of the diaphragm aperture) produced on the optical axis of the lens.

Distortion is always present in single lenses, and generally in the compound meniscus form used for view lenses. This fault consists in the rendering of straight lines in the object as curved lines in the image—thus a square building will appear either barrel-shaped or dice-box shaped. With rapid rectilinears and the lenses on the same principle distortion is rarely, if ever, found. One more point to note is the

Non-coincidence of the visual and actinic foci. To test for this arrange an odd number of playing cards (say five clubs or spades), one before the other, so as to form steps, each being farther from the camera by one inch, but all facing square to the camera. Focus the middle one carefully, expose a plate and develop; if any other card is better defined than the middle one the foci do not coincide, *or* the dark slide does not register accurately with the focussing screen.

Tips in the Field.

Cover the diaphragm slot of your lens with a broad rubber band. Light entering from this source is frequently the cause of fog in the negative; besides which the band keeps the diaphragm itself from falling out, if the camera is carried any distance and you have forgotten the fact of the diaphragm being still *in situ*.

Take Great Care of your Lenses.—The polish on a photographic lens, although not so perfect as that on astronomical objectives, is easily damaged, and a falling off of brightness in the image is the result, and not merely of brightness, but of an indefinable something which just takes off the bloom of the resulting picture. Hence, wipe your lenses carefully, and *do not rub* with chamois leather.

Oil your ground glass screen lightly with sweet oil or vaseline. However finely the glass may be ground the small amount of oil, &c., renders it much more translucent, and in the case of coarse ground glass the effect is markedly beneficial. Of course we do not mean you to swamp the glass with a greasy mess, but just rub it over lightly, and wipe off nearly all, just leaving it greasy, and that is all. Moreover, do this frequently to remove dust, which always accumulates on the oiled surface.

Keep each lens in a wash-leather bag, or, what is better still, in a bag made of kid. Now-a-days our better halves go in for kid gloves which "would have made Quintilian stare and gasp." We mean the gloves which keep their elbows warm. Now the arm portion of one of these gloves will cut into two capital bags for lenses. Of course if the tyro has plenty of spare cash the small leather cases lined with baize and divided into compartments for different lenses are very superior, but I am supposing the reverse case.

Tripods with sliding legs have their advantages, and also their disadvantages. Among the latter probably the most frequent is a habit of sticking, and requiring considerable force to get the sliding portion out to the required length. The best lubricant in such a case is the ordinary household blacklead rubbed dry on the sliding surfaces. The same remedy is useful for shutters to dark slides, which often fit too tight. In fact, for all wooden surfaces which slide against wood, blacklead is most useful in this direction.

A convenient screw for the tripod head consists of a long screw, on which travels a butterfly nut. Its convenience will be appreciated when taking interiors and the ordinary tripod is not high enough, nor are there (in the case of churches) any convenient pews about. Then the payment of a small fee will generally produce a pair of steps: a gimlet soon

Do you want anything?
Do you want to sell anything?
Do you want work to do?
Do you want a situation?
Do you want an assistant?

IF SO,

ADVERTISE

IN

Photography Emporium

THE BEST PAYING AND MOST POPULAR MEDIUM OUT.

Terms, Prepaid { Private column, 12 words for **6d.**
THREE INSERTIONS FOR THE PRICE OF TWO.
Professional and Trade column, 24 words, **1s.**

READ THESE.

TWENTY-FIVE TO ONE!

28, Grange Street, Paisley.

Dear Sir,

Would you kindly withdraw my advertisement in your sale column of "Ideal" Hand Camera, as I have sold it. I could have sold a dozen of them. I never had so many replies before. I advertised it in the ——— last year and only received one reply. With your journal I have received 25 applications for it. I sold it to the second letter received—from York.

Yours sincerely,
THOS. H. TAYLOR, L.D.S.

FIFTY TO ONE!

160 and 162, St. George's Road,
Glasgow.

Gentlemen,

. . . I may say that THE TWO INSERTIONS IN YOUR PAPER BROUGHT ME IN 50 ORDERS for patterns. The same advertisement was in the —— last week, and as yet has only resulted in one order. Your charge was 1s. per insertion, whilst the —— for the same charged 3s. 6d.

Yours truly,
DAVID BLACKLEY.

ALL ADVERTISEMENTS MUST BE SENT BEFORE TUESDAY MORNING TO

ILIFFE & STURMEY,

"PHOTOGRAPHY" Office, 19, Hertford Street, Coventry.

By the Author of "Strange Clients."

THE MYSTIC SERPENT

BY

SAUMAREZ DE HAVILLAND.

"The book bristles with incidents of a startling character. . . . . Decidedly exciting, and displays evidence of a strong imagination."—*European Mail.*

"A remarkable book—a work which seems likely to create as much attention as 'Robert Elsmere.'"—*Midland Daily Telegraph.*

"In the story of 'The Mystic Serpent' we have an 'unhallowed club' composed of undiscovered murderers."—*The Manchester Guardian.*

"It is a marvellous narrative. . . . The plot is made up of remarkable incidents, in which hypnotism plays an important part."—*Leeds Mercury.*

"Sarcasm not unworthy of Thackeray. . . . There are many gems of literary construction in 'The Mystic Serpant.'"—*Evening News and Post.*

"A book for the Gnostic Sisterhood. . . . The author dedicates his novel to Lady Florence Dixie, a 'leader of the newly-evolved order of humanity.'"—*The Star.*

"Full of horror and power. . . . . A tale of unequal merits, but at times of fascinating force and interest. Its style is brisk and animated, and the author possesses brilliant descriptive power."—*Scottish Leader.*

Crown 8vo., Cloth.

PRICE SIX SHILLINGS.

At all Libraries and Booksellers.

LONDON:

Iliffe & Son, 3, St. Bride St., E.C.

makes a hole through the top one; the advantage of the long screen is now perceived as it easily embraces the the thickness of the wood, one end of the screw fits the camera base, and the butterfly nut makes all taut.

Waterhouse Diaphragms.—These always have a happy knack of getting distributed about one's pockets, necessitating a thorough search before the particular aperture—which somehow always contrives to lie hid till the last—is found. A good plan, therefore, is to bore a small hole in the tongue of each diaphragm, so that when the diaphragms are laid one over the other the holes are coincident, and then pass a piece of copper wire of correct thickness through the holes and flatten it out at each end, thus holding the diaphragms together. When one is inserted in the lens slot, the others are turned up out of the way. Now, however, that the Iris diaphragms are nearly universal, it is better to have them applied to lenses which only have the Waterhouse arrangement, though this, of course, means an extra outlay of from 10s. to £1 according to size.

See that the dark slide registers accurately with the ground glass in the focussing screen. This can be easily tested as follows. Get a straight edge and a wooden wedge (we use a set square). Across the inner side of the focussing screen frame place the edge of the straight edge, and under it slide the wedge and mark the point where it touches, when the wedge is flat on the glass. Now take your dark slide, put two pieces of glass in (as you would when loading), and see if, when the straight edge is placed across and the wedge moved up, the mark again is where the edge touches; if not, you must jockey the focussing screen, by inserting wedges of cork, &c., until you get the register correct.

Secure the focussing cloth either by cutting a hole in the middle of one of the longer ends about three inches from the edge, and just large enough for the lens to pass through easily; or by sewing on an elastic band to two adjacent corners. Nothing is more annoying than to have the cloth blown off the camera just as you have secured the point of view and wish to focus accurately. It is all very well to say "always keep cool," but when little things go wrong the resulting picture somehow always seems to show it. Again, have a good large cloth so as to be able to cover the whole body of the camera, and your head as well, without having to squint at the ground glass with your nose nearly touching it.

Secure the cap to the lens by threading a stout needle with thread or silk, &c., and piercing through the rim of the cap, tie one end of the thread, &c., to the cap, make a slip-knot on the other end and draw it tight over the lens mount. By this means, when focussing, the cap hangs down attached to the lens; and dropping it, fumbling for it in pockets, &c, are all obviated. Moreover, when the camera is carried ready set up, without this precaution the cap frequently drops off and is lost.

Have two caps for each lens, one to fit the hood and one to fit the other end of the mount; this will prevent the lens getting accidentally scratched; and, what is more, should the hood cap get lost, by unscrewing the hood the other cap comes in handy for exposing, as it fits the mount.

Have a spare screw for the tripod in case of an omission to take the usual one, and further in this spare one have a hole drilled, so

that it can be put on your key ring. No doubt we may appear finicking, advising all these spare things, but the blankety-blankness that ensues when the tyro arrives at the scene of operations all a-glow to expose the whole dozen of plates he has brought, and then finds that he has forgotten his tripod screw, or his diaphragm case, or his tripod top, &c.! Of course, we know there are make-shifts; thus a good stout twig will sometimes do for a tripod screw, and we know, for a fact, of the use of a leaf of a tree for a diaphragm. The fact that you have lost your tripod head may make you feel sultry, but it need not always end in your losing your own, and remember a camera can frequently be held in the hand for shutter work, or rested on a railing for time exposures. Our own first snap shots were made with a quarter-plate camera held in our hand.

The Tripod under Difficulties.—The usual, and no doubt best, way to spread the legs of a tripod is to have one leg well in front and work between the other two, but in certain circumstances a different arrangement is necessary. For instance, in a high wind always spread out one leg in the same direction as the wind is blowing, and the other two towards the wind. For example, if the wind is dead in front of the camera, have one leg stretched out behind and the other two in front. Again, sometimes the wind seems to come from all round the compass; in this case tie a string to the tripod screw and suspend your camera case within the outstretched legs. On sloping banks shorten one leg and arrange the other two nearly level lower down the slope. For slippery floors use corks on the sharp points of the tripod legs, and knot three pieces of string together at one end, tying the other of each to each leg.

Seconds Pendulum.—This is a very simple contrivance, and saves trouble. Get a lead bullet, drill a hole through it and thread it on a piece of string having a large knot at the end. Measure the string so that when a loop to attach it to the tripod screw is made the whole length is 39⅛ inches. This when set oscillating will beat sufficiently exact seconds for all photographic purposes. It frequently happens that when one trusts to counting seconds the exposures go wrong; and when a watch has to be consulted with one eye and the cap taken off and replaced under the guidance of the other, accidents occur.

Remember to use the swing back in all cases where you have plenty of detail in the foreground, and the middle distance also requires to be rendered distinctly. Again in all seascapes where there are fine clouds on the horizon and at the same time figures, breaking waves, &c., on the shore line close at hand. By drawing the swing back outwards at the top you will find that the near objects in the foreground are rendered sharper, and therefore a larger aperture can be used and the exposure relatively decreased. Also

Remember to utilise the rising front where the foreground is too obtrusive or uninteresting, or where the point of view secures the effect desired, but the tops of trees, &c., are not included and would be an improvement. Again, the rising front is most useful when taking views uphill and where the hill is steep. For instance, a view up a street at the end of which is a church, &c.

Always have your focussing screen vertical whenever straight lines—buildings, masts of ships afloat, &c.—are included in the view. Nothing looks worse than buildings either too affectionate and inclining at the top or the reverse. At the same time have the screen horizontal, or all your straight lines will lean to right or left. In pure landscape the matter is not so important, and, in fact, many effects can only be secured by having the screen out of plumb. A good plan is to carry a small circular level and level your camera back by it, then you are sure to be all right. Of course, if you only use a view lens there will be distortion of straight lines, which can only be cured by getting a rectilinear lens.

Substitutes for a Ground Glass Focussing Screen.—If while on tour you should be unfortunate enough to break the ground glass screen, and have not another piece of ground glass—as you ought—in your kit, the following dodges will give fair results. (1.) Expose a dry plate of the required size to gaslight for a second or two, then develop until a slight grey deposit is obtained, wash and fix; wash, and when dry the surface will be found admirable for a screen. (2.) If you have no developing kit with you, and there is no glazier's near, put a dry plate into boiling water and melt off the film, clean and dry, and then get some putty—if there is no shop whereat to get this, take some tooth-powder and mix it with a few drops of, preferably, boiled linseed oil, or if not this then salad oil, until of the consistency of putty—stick the ends of your fingers in this, and then lightly go over the glass, just dabbing the tips of the fingers on the glass, each time making five marks; go all over like this with the same sort of stippling motion until the glass is lightly but evenly coated. Allow the putty marks to dry somewhat, and then fix in the reversing back. Or if you can get some varnish—hard crystal is the best, but I have used even oak varnish thinned with spirit—give the cleaned and warmed glass a thin coat; when dry, rub all over gently with the tip of the finger, previously rubbed on a piece of resin, chalk, whitening, &c. The surface of the varnish will become just abraded and furnish a screen which, when carefully made, is superior to fifty per cent. of the ground glass to be bought at a glazier's.

Use the back combination of a R.R. lens alone when taking distant mountain scenery, &c. Frequently, however, the camera will not extend sufficiently far, and in this case unscrew the back combination and use the front alone *in situ*, thus gaining the length of the lens mount. It will be well to remember that, roughly speaking, the single combination of a R.R. is generally twice the focal length of the whole lens. Thus in a 7 × 5 R.R. of $8\frac{7}{8}$ inches focal length, the back or front (for they are frequently symmetrical) combination has a focal length of about 16 inches, and consequently to use it the camera must extend to nearly 20 inches. Again, remember in using the same stops that they represent just half the aperture marked for the whole lens, thus f/8 will be f/16, and so on. Another example of the utility of one combination is what occurred to us a short time ago. We were asked to photograph a fine group of coleus plants. The pots were arranged in three rows, and naturally the front row was lowest and some distance in front of the second, and similarly as regards the third. We focussed with our R.R. complete, and invited the owner of the plants to look at the picture on the focussing screen. He, however, wanted the group to come out

much larger. When we moved nearer, of course, the front row appeared much out of proportion, and the last row was quite dwarfed. We then returned to our original position, and by using the back combination alone obtained the desired result.

Do not abuse the power stops give you and subordinate the distance. We do not advocate fuzziness, but at the same time let your view be as much a picture as possible. Therefore do not have your extreme distance as microscopically distinct as your foreground. More especially, do not use a smaller stop than is absolutely necessary when engaged in portraiture. In fact, don't use a stop at all if the face comes out fairly sharp without it. And this question is all the more important in proportion to the size you chiefly work, for a view 10 × 8 sharp all over is absolutely unnatural, unless it be an interior, and even then print on rough paper to kill the sharpness a little. Of course with a group —which, of course, the tyro always *must* take—a stop is necessary, but do not overdo it.

Tips in the Dark Room.

Use glass-stoppered bottles and prepare the stoppers in the following way before using them. Take a little vaseline and rub over the stopper, then insert the stopper in the bottle and work it round so as to distribute the vaseline over the ground part of the neck; now remove the stopper, and with a clean rag wipe off nearly all the vaseline, and do the same with the neck of the bottle. This procedure will save much objurgation caused by fixed stoppers, and many queries as to how to get them out. Should they be fixed, however, owing to neglect of this simple precaution—

To remove fixed stoppers, take the bottle in the left hand, holding the neck by the first finger, and apply pressure with the thumb against the stopper; now on the other side of the stopper tap gently with some hard substance such as a wooden ruler, and in a direction opposite to that of the pressure of the thumb. After a few taps, turn the bottle round and apply the thumb to the opposite side of the stopper, and give a few more taps, repeating the process until the stopper is loosened. This plan we have found far more efficacious than any other, such as inserting the stopper in a partially closed drawer, turning the stopper by main force with pincers or teeth, &c., and the most obstinate stopper will yield if you only have patience, and do not hit too hard; on the contrary, let it be gently, for if the stopper breaks off short there is nothing for it but to knock off the neck of the bottle.

Labelling Bottles.—Nothing rouses such feelings of disgust as having a bottle full of something and not knowing what the sometbing is. One does not like to taste it, as pyro and other photo chemicals are violent poisons, and yet one does not care to throw it down the sink. Possibly the solution, &c , was duly labelled when made up, bought, &c., but that confounded label has come off! If you must label them at all use the following gum, which does not chip off :—

Gum arabic	2 ozs.
Water	2 ozs.

Dissolve and add

Soaked gelatine	½ oz.
Glycerine	30 drops

and small lump of camphor. Dissolve with heat. When the labels are attached with this, give them a coat of copal varnish. But our practice for the last two years has been not to use labels at all, but to keep separate 10, 20, or 40 oz. bottles each for their single solution. Thus, 10oz. for pyro, eiko caustic, alkalis, bromides, &c.; 20 ozs. for carbonates, hydroquinone, &c.; 40 ozs. for hypo, oxalate, eiko stock solution, ferrous sulphate, &c. Now as these bottles are only used for the one solution, it is obvious that their labels would soon become most unseemly in appearance. We, therefore, procured a small tin of Aspinall's white bath enamel and a small brush (which, however, we soon discarded in favour of a wax vesta which is lit and the head knocked off), and proceeded to paint in letters about half an inch high abbreviated titles for our solutions. Thus—Pyro, Hypo, Eiko, Quinol, Am. Br., Pot. Br., Pot. Carb. Though for most we usually paint their chemical formula. This enamel dries quickly, is easily seen in a dark room against the blue glass of the bottles, does not wash or fall off, and will stand boiling water.

Assign places to bottles on shelves, and always put them back at once. Little points like this make all the difference between hard work and pleasant work. In our dark room, even without a light, we are so accustomed to the particular place of each reagent that we would venture to guarantee taking down any one of the bottles in the dark correctly. We arrange them in order of using, thus:—pyro, bromides, then ammonia and the three carbonates. On the next shelf we have eiko, then quinol, and the caustic alkalis. Then right away from these we keep our hypo, ferricyanide, ferric chloride, &c., on another shelf on the opposite side. Another point worthy of note is

How to take down and Pour from a Bottle.—No doubt the gentle reader smileth at this heading, but it is just these little points, &c.—*Vide supra.* Some young amateurs have an unconscious way of shaking up every bottle they get hold of. Now all solutions should be clear when used, and frequently a sediment forms at the bottom of the bottle, which if left undisturbed causes no inconvenience. The moral, therefore, is take down each bottle quietly and without shaking it up. Thank goodness! some solutions won't stand any violence, and resent it by blowing out the stopper, and to prove this let the shaking enthusiast try his tricks on a bottle of ammonia, s.g. 880. Again, many amateurs wonder why their fingers, labels, &c., get into such a dirty condition, and it frequently occurs from not knowing how to pour out solutions. The bottle should be held label *upwards*, and the hand grasping the bottle from above, *not sideways*. Then the drop from the bottle will always run down the same track, and the fingers will not come in contact with it. In the case of strong acids this is a point of some importance.

Mix your own Solutions if you Want to do Good Work.—The man that buys a firkin of some maker's ready-made developer, only knowing that it contains, say, quinol, is not much better than the ever-to-be-deprecated-press-the-button-and-we-do-the-rest individual. He cannot

vary it with any degree of certainty, nor can he, unless exceptionally "lucky," rely on getting good results from plates which have had varied exposures. The only cases where such a method may give fair returns are in a studio where the exposures are suited to the subject by an experienced operator, and hence are more or less uniform, or where the amount of successful work *shown* is only a small percentage of the whole amount, and this is mere luck. Therefore, keep your solutions separate and mixed in known proportions, the best being 10 per cent for all those substances which will easily admit of it, such as pyro, caustic alkalies, carbonates and bromides of alkalies, sulphite, &c. Hypo is best kept in saturated solution, and half this and half water used for negatives, while 1 to 4 is strong enough for prints. Quinol is best made up in bulk, according to Thomas or the Ilford formula. With eikonogen you can at most get a 3 to 3½ per cent. solution, and this, therefore, being a saturated solution, is convenient enough. Knowing the strength of your solutions is always a power in your hands, and by studying the effects of the different reagents you use, and the requirements of your subject, exposure, &c., you are at least able to get as much out of the particular process as it will yield. Remember that generally with negatives pyro, quinol, &c., give density, and in big doses restrain; bromides restrain, and give contrast and hardness, while the accelerator gives detail, and in big doses fog all over the plate; but of this more anon.

If you use a dropping bottle be sure to measure the drops, as there is a great variation in this respect. Take your minim measure and dry it thoroughly, then drop from the dropping bottle ten drops, and it will be surprising if the measure indicates ten minims. Very probably it will show at least fifteen minims. Note this carefully on the bottle, if possible, and when using it discount the discrepancy. Thus, if you wish to use, say, twenty minims of ammonia from the dropping bottle, count out thirteen drops, and that will be near enough; whereas, if you had used *twenty drops à la* bottle, fog would very likely have resulted, and, of course, it would have been the fault of that plate-maker, or camera, or anything but the right cause.

Development with Eikonogen.—This developing agent is most useful for band camera work; the only drawback, however, being its feeble solubility in water, a three per cent. solution being nearly saturated. This necessitates its being made up in bulk, but if the following directions are followed it will be found to keep well—in fact, we have some now (Dec.) in perfect order which was mixed in May last. We use a saturated solution in conjunction with sulphite of soda, and prepare it as follows:—We take a forty ounce bottle, and into it empty a one-ounce tin of eikonogen. We then prepare a ten per cent. solution of sulphite of soda with boiling water, and while still hot pour about two ounces into the bottle, give a good shake up, allow the crystals to settle, and decant these two ounces into a cup, &c. If this solution is only of a light green tinge no further washing is necessary, and we fill up the forty ounce bottle with the hot ten per cent sulphite solution; lay it on its side after a shake, and give it an occasional shake during the next few hours. The next morning we turn it up the right way, and when the crystals have settled at the bottom, decant off ten ounces into our usual-sized developing bottles for use, filling up the forty ounce bottle with more ten per cent. sulphite solution. Thus we have it always ready for use. For developing

take three parts of this eiko and one part of ten per cent. carbonate (soda or potash or both). For portraiture eikonogen is most valuable, as a it gives fine deposit with full detail, erring, however, on the side of thinness. For snap shots, intended for gelatino-chloride or bromide printing, or for enlarging, it is also most suitable. For greater density use it combined with the ordinary quinol developer, or in a combined solution, as follows:—

Eikonogen and quinol, when used together, form a most serviceable developer for hand camera shots, more especially when the shutter has been worked at a high rate of speed. The following is a Continental formula, and due to M. Rossignol:—

Eikonogen	..	30 grammes	.. 132 grs.
Quinol ..	..	10 ,,	.. 44 grs.
Soduim sulphite	..	200 ,,	.. 880 grs.
Water ..	..	1000 c.c.	.. 10 ozs.

The sulphite is first dissolved in the water; to this the quinol and eikonogen are added, and dissolved by the aid of heat. The alkali recommended is a ten per cent. solution of carbonate of potash, and they are used in equal parts. This is a most powerful developer, and many plates will not stand it unless diluted with an equal bulk of water. It, however, possesses the advantage of bringing out detail, and at the same time giving density. If when the solution of eikonogen is cool, crystals be deposited, the clear supernatant liquid is to be used. Carbonate of soda (ten per cent.) will work well with this developer, while if great density is required, equal parts of carbonate of potash and carbonate of soda are to be used.

Use a brush in development, when local acceleration or retardation is required. The best sort of brush is what is called a gilder's mop; it is of camel-hair, and should be mounted in quill, with no metal about it. A capital brush, however, is easily made by drawing with a looped string a tuft of cotton wool partially into a piece of glass tubing, and trimming it roughly all round. Whichever is used the plate is sloped, and the brush, previously dipped in the required solution, is swabbed across the required portion. By this means there is a power placed in our hands of

Remedying Over-exposure.—Commence developing with a normal strength developer, say the ordinary pyro and ammonia (pyro, 2 grs.; bromide, 1 gr.; ammonia, 2 minims to the ounce). If the plate is over exposed the image starts to flash out, immediately flood it under the tap, and then soak the plate in a weak bromide solution; while soaking in this wash out another dish and take the plate out of the bromide, rinse under the tap, and place in the clean dish. Now, supposing it is a landscape, tilt the dish so that the sky portion is uppermost, and with the brush and with the same developer (to which you have added some six grains more pyro) bring out the foreground. Remember that overdoses of pyro act as *restrainers; do not give hardness*, and give *density*. Now after each three or four applications of the brush which must always be on the move and not rest in one place—give the plate a wash. When all the foreground is out wash the plate well, turn the dish round, and attend to the sky. In this way also clouds can be secured in the negative, which otherwise would not print. Of course,

Remedying under-exposure is also, to a certain extent, possible by the same means, using, however, a developer stronger in accelera-

tor. Of course, under-exposed negatives are usually characterised by hardness, and we therefore must recommend strongly the use of eikonogen with or without quinol for their development. Soaking the plate in a weak bath of alkali or other accelerator, before proceeding to develop, sometimes has a marked effect; but what perhaps is better, use warm water for your developer, if you know your gelatine film will stand it. A warm developer is far more powerful than when cold. In connection with this it is always well to

Note the temperature of the dark room, and work with the solutions at as nearly as possible the same temperature, if uniform results are to be expected. Therefore, a jug of hot water in winter is a most useful adjunct to quick and successful work. The most comfortable temperature both for dark room and solutions is about sixty degrees F., and it would be well if the dark room could be always maintained at this. In summer, however, it is liable to get above this, though the addition of cold water will keep the solution all right. It will, therefore, be a great point to

Thoroughly Ventilate the Dark Room.—The lamp should, if possible, be entirely outside, and if this is not come-at-able, it should have a tin tube fitting the top and communicating outside, to carry off the products of combustion. If the dark room is small, some other means of ventilating it should also be attempted. A perforated zinc plate let into the wall high up, and boxed in except on the upper side, is a good plan; or a good sized tin tube let through, and bent twice at right angles.

Use a rose on the tap for washing plates, &c. The advantages of this are, briefly, more thoroughly washing in less time, less likelihood of searing the film, and a more even distribution of water over the plate, &c. The only disadvantage a rose has is the difficulty of filling bottles, but if a funnel is handy (or, better still, another tap), this is of no great moment. If a rose is not come-at-able (we use the rose belonging to the garden-hose—but mention it not in Gath!), a length of rubber hose, about twelve inches, is a capital substitute, and in some cases even superior.

A deep lead-lined sink is far superior to the earthenware ones, as, if a plate is dropped, there is a chance of not breaking it; whereas it is bound to get bent with the earthenware. Also have the sink deep, as it can, by plugging the waste with a cork through which a glass tube passes, be utilised for washing purposes. A very good idea is to have the sink V-shaped, as in this case there is no splashing, and a dish of any size will rest in the V.

In developing do not hurry, but let the plate have all the care and attention possible. It is economical in more ways than one; it saves plates and temper, and occasionally preserves a memento of a scene which cannot be repeated. Three-quarters of an hour is really none too much for some subjects, and do not be impressed by the brother amateur who prides himself on having taken a dozen views and developed them in an hour. Many tyros just spoil their negatives by not developing far enough, and get frightened when their deep shadows (light parts in the negative) begin to veil over. Remember there is no such thing as black in nature, except where there is no light, as down a mine, &c., and consequently there should be no clear glass in a negative.

Beware of air bubbles when developing, and a fertile source of this is a preliminary soaking in water. If you must soak be sure to go over the face of the plate with a wet pledget of cotton wool or a brush. But after all, the soaking is not necessary; flow your developer over with one sweep, and rock the dish at the same time, then swab with cotton wool, and no bubbles will trouble you, but be sure to wet all the film.

Mark the plates to correspond with the slides, sheaths, &c., when filling up, and then, if you put the exposure with this number in the note-book, you can immediately spot your subject and exposure when about to develop. Thus, suppose you have a hand camera of reservoir pattern with sheaths. Mark your first plate 1, put it in the sheath and in the reservoir, and then mark the next one 2, and so on. Many a good shot is spoiled by not knowing what to expect when developing, and so mistaking the subject and exposure.

To quickly dissolve salts wrap them in a piece of clean muslin and suspend in a jug near the surface of the water. The solution thus goes on rapidly, and there is no need to shake, as the heavier, *i.e.*, more concentrated, solution falls to the bottom, making room for a fresh supply of solvent to reach the salts. Again, this plan frequently saves after filtration, especially with some samples of hypo, which are sometimes extremely full of bits of straw, wood, &c. And this method applies equally to such salts as quinol, eiko, &c., which generally require heat to effect solution.

Prints can be rapidly washed as follows:—We will suppose them fixed and soaking in a basin of water. Take a plate of glass rather larger than the prints, and fill another basin with water. Have at hand a flat squeegee, take a print, put it face down on the glass and lightly squeegee it until it lies flat, then use a little more vigour and squeegee as much liquid as possible out of it, working from the centre to the edge, give it a rinse under the rose and put it to soak in the second basin. Take a second print and do the same, and go on until all are in the second dish. Empty the first dish, rinse and fill again with water; then take the prints in the second dish, turn them over so as to have them in the same order as before, give them each a squeegee, and put them to soak in the first basin. This process repeated three or four times will get rid of more hypo than mere soaking for hours.

Keep your Hypo in Saturated Solution.—There are many authorities who strongly object to this method, but we think the advantages more than balance the disadvantages. Among the latter are (1.) Uncertainty of the strength of the saturated solution. This is of no great moment, as if the saturated solution is kept in the dark room, and the latter is maintained at a fairly level temperature, the solution is nearly always the same. (2.) Deterioration in solution. This we have not found to occur nearly as much as when hypo is kept in crystals. (3.) Difficulty in making up to required strength. Now this we consider a distinct error, as if we do not wish to be *ultra* particular a saturated solution is generally about the strength of a forty per cent. solution, *i.e.*, five ounces of saturated solution contain about two ounces of hypo. Knowing this, see how convenient it is to only have to measure out five ounces and fill up to ten ounces with water to have the usual four ounces to twenty of water solution. Again, when hypo dissolves, a

great deal of heat is absorbed, and the solution becomes very cold, and therefore requires to be made either some time beforehand or with hot water. In our method this is obviated. Again, the solution by the other plan generally requires filtering, whereas by this method the supernatant liquid is usually quite clear.

Back your plates with caramel, as there is no doubt it forms the most effectual backing, thanks to the exertions of Mr. J. S. Teape. The following formulæ will be found useful:—

(1.) Gelatine (Heinrich or similar) 30 grs., soaked, squeezed, and dissolved with heat; then
Caramel, 1 oz., is added.
This is a fine backing, but slow drying.

(2.) Caramel .. .. 1 oz.
Gum mucilage .. 1 ,,
Sienna (in powder) 1 ,,
Work them up in a mortar, and if there are air bubbles, let it rest, and they will dissipate.

To make caramel (for though it can be bought, that home-made is more effectual and dries quicker), take one pound of loaf sugar (this will make about ten ounces of caramel), put it in a large saucepan—preferably of copper—and place over the fire and watch it carefully. After it has dissolved it will start to boil, and then look out!! Keep it on and off the fire, stirring with a stick vigorously, let it burn thus for half an hour and set aside to get cool, and then add about one third of its bulk of hot water and stir it well in. The resulting liquid should be about as thick as treacle. But you must be careful when it is boiling, as the grate in our den looked something too awful after our first attempt.

Hand Camera Tips.

See that the hand camera is light tight, not only when held upright, but also when held upside down and sideways. In the class of cameras having two finders, one for landscapes and the other for upright pictures, it frequently happens that when used for landscapes no leakage appears, but when held on one side for upright pictures light gets in and fogs the plate. This happened to us in Wales this year, and after climbing down a most hazardous place to get a shot at Aberglaslyn Bridge from below it, and taking it upright, we found on developing two plates that both were badly fogged, while with other shots taken on the same day, and with the camera held the ordinary way, no trace of fog was discernible. To test this, try three plates on any view and in sunshine, and develop. If there is a streak of fog, note the position on the plate, open the camera, empty it, and then take it into the sunlight, envelope the head and back of camera in under a focussing cloth, and hunt for the leakage by placing the finger along all slots, &c., in the case; when found, cover this particular spot or spots with black paper. Sometimes the finders let in light, therefore see to them also.

Have large finders, and on each mark the exact amount of subject which you get on the plate. To effect this, place the camera on a table before an open window at home, and mark with a pencil the position. Now expose

a plate on this, develop, &c. Then placing the camera in the same spot. note the limits of the view in the negative, and stick a mask on the finder corresponding to these, also mark a centre spot with a touch of black paint. Do the same with the upright finder.

Have a hood over the finder, as in bright light it is really difficult to shade the finder with the hand, and at the same time hold the camera steady. The hood should be large, and capable of being raised and lowered, and should be something of the shape of a prompter's box on the stage.

Follow Moving Objects on the Finder.—This, we know, is just contrary to the advice given in last year's ANNUAL, but it is the outcome of two years' experience with a hand camera. We at first tried the other method, namely, looking at the object and shooting at the critical moment, but the result, in nine cases out of ten, was that the principal object was nowhere near the centre of the plate, and in some cases was missed altogether. We then adopted the above plan, and found it worked well, after a little practice. The difficulty which has to be overcome is to allow for the fact that with the ordinary finder right and left are reversed. That once mastered, all goes well. As a natural corollary to this tip comes

Keep Cool when Taking Shots.—Do not get excited if you can help it. We remember at a lacrosse match taking a shot at the moment a goal was scored, and the "crosses" were being shied into the air by the jubilant scorers. We also were jubilant, and the result was—well, not funny so much as peculiar. Everything seems to have had a bad attack of earthquake. Therefore, be calm and decided, and press the release firmly, so as to obviate that awkward after-question, "I wonder if the shutter went off!"

Hold the Hand Camera as nearly Level as Possible.—A small circular level in a case to carry in the pocket is a most useful adjunct. Of course, with moving objects, where a particular object has to be followed, everything has to be sacrificed to that one point, but in ordinary street views a level is almost a necessity. Nothing looks worse than houses all out of the perpendicular. In fact, drunken architecture is well named, for either the houses are in a maudlin affectionate frame of mind and want to embrace, or they have quarrelled and are falling away from each other. Moreover, if lantern slides are to be made from the negatives, nothing is more glaring on the screen than these tumble-down buildings.

Do not work the shutter at an unnecessary speed. Most ordinary shots will never require less than $\frac{1}{10}$ second; very few less than $\frac{1}{25}$ second, while only exceptional ones less than $\frac{1}{50}$ second. What is the object of firing off at a street view, with pedestrians and carts, &c., some distance off, with the shutter set at $\frac{1}{10}$ second when $\frac{1}{25}$ would be amply fast enough? Again, some amateurs delight in taking express trains so as to show every spoke distinct if they can; why not take the train before it starts and make sure of those spokes?

Do not make the Hand Camera a Detective.—You have no right to abuse other people's good nature, nor to take a photograph of a person in any ridiculous or otherwise unusual posture, which, if shown to him or her, would hurt their feelings. It is this ungentlemanly abuse of the

hand camera which brings the whole class of hand camerists into disrepute. We could say much more on this point, but refrain from doing so, feeling sure that our advice will be favourably received by all who have any self-respect.

You can compose your picture on the finder of a hand camera as well as on the focussing screen of an ordinary camera, and the same amount of care should be bestowed on this when time will allow as when using a tripod. There really is no reason why your shots should not be as artistic and as much a *picture* when taken with a hand camera as in any other way. Of course there are some subjects which do not readily lend themselves to the use of such a wide-angle lens as the hand camera generally has, and these should not be attempted.

Take two shots at special subjects, and these are broadly divided into two classes. First, those subjects in which fine cloud effects are combined with a view possessing deep shadows. In this case a plate can be exposed for the clouds at a rapid speed, and another for the landscape much slower. Secondly, some subjects are worthy of two shots when they are only to be got at after considerable labour or danger. Then when you have got the chance take two shots to make sure of one good result

Remember that an east wind means bad light, however otherwise bright the day may appear. A dry wind always carries with it numerous particles of fine dust, and this fact has a marvellous effect on the actinism of the light. The dust particles reflect a yellow light, and more or less absorb or interfere with the blue and ultra-violet rays, which are mainly relied on in photographic work. The weather generally has more to do with the light than one would think, and a rainy day is not necessarily a hopeless one for photography. In fact, some of the finest effects and the most rapid light occur on days in which sunshine and showers alternate. The air is rendered free of dust by the showers, and the sunlight then has full play. Be careful, however, to avoid the false lighting which wet rocks and foliage frequently give.

Do not Blame the Hand Camera for your own Faults.—There are many subjects which are practically impossible for a hand camera; such as interiors, mountain scenery generally, evening effects, &c. Although we have seen an interior and lots of mountains perpetrated by a hand camera, the results, as a rule, are so poor as to amount to a mere waste of plates. Keep the hand camera for its legitimate work (and surely that is ample), and do not ask it to do impossibilities, and even if you do, and are disappointed, do not blame the hand camera, or rather its maker.

Tips on Printing, Toning, &c.

Clean the back of negatives before attempting to print from them. The best way is to do this after fixing, as the gelatine is then soft and comes off readily, and the subsequent washing works in the same direction. If, however, the negative is allowed to dry, and there are large patches of emulsion, which have been spilt on the back, scrape these off as much as

possible with a knife, and then finish cleaning with a damp piece of cloth. Of course, if your plates are to be backed efficiently, the cleaning comes in at an earlier stage, and then the backing is all that has to be removed.

How to Keep Sensitised Paper.—The simplest and one of the most efficient ways to do this is to make a small press for the purpose. This consists merely of two flat pieces of wood about 2in. longer than the size of the paper and 1in. broader; at the centre of each end is fitted a screw and bush, by which the boards can be clamped tight together. The paper is placed between two pieces of blotting paper, and the whole placed between the two boards and clamped tight, and the press put into any convenient drawer with a piece of brown paper round it. The air is thus kept from the paper, and we have found it keep well for months like this.

Cut the paper lengthwise for portraits, especially for large heads, if the original has a long face; and crosswise if the original is chubby and broad. The reason for this is that, as the prints are mounted wet, the expansion is greater in a lateral than in a vertical direction, and hence a broad face gets broader if the paper is cut lengthwise, and *vice versâ*. Of course, for absolute accuracy the print should be mounted dry, by starching the back and allowing it to dry and moistening the *mount*.

Beware of warp in the printing frame, and this may occur in two ways. First, the rebate of the frame may be warped, and then when the negative is inserted it does not rest flat, and when pressure is applied, "bang goes the saxpence!" Of course, this applies all the more strongly to large sizes. Moral—buy well-made frames for large sizes, and pay a little more to have them good. The second way in which warp may appear only occurs with cheap frames, and it affects the hinged back. The wood in the divisions warps, and unless two or three pads are used when printing, there will not be contact all over the face of the negative, and fuzziness results. Therefore, see that the hinged backs of your frames are clamped, and then defy warping.

To print from a hard negative and secure a good result, dodging is necessary. This takes the direction of shielding the thin parts of the negative in order to allow the very dense parts to print. A good plan is to coat the glass side of the negative with collodion coloured with aurine, and to scrape away the collodion from the dense parts. Another good way is to coat with ordinary spirit varnish coloured with tincture of iodine. If only a slight amount of protection is necessary, coat with ordinary negative varnish, and rub up the surface with the finger where protection is needed, so as to make it more or less like ground glass. Another plan is to cut out rough masks, and print the dense parts first, using the mask to shade the thin parts, but care must be taken in this case to keep the mask in motion, or there will be a hard line on the print.

To Print from a Flat Negative.—Good results are difficult to obtain in this case; but matters can be improved, either by printing under green glass (which can be bought at the dealer's) by staining the *film* of the negative purposely with pyro—that is, place the negative in a dish, and pour over it a solution of pyro, and allow it to soak until stained all over—or by printing on bromide paper and exposing at a long distance from the light. (For details, see last year's PHOTOGRAPHY ANNUAL, page 179.)

Beware of Cheap Chloride of Gold.—The usual proportion of gold in fifteen grains of the chloride is seven grains, and there are samples of chloride which can be bought cheap, but cannot possibly—except at a dead loss to the dealer—contain anywhere near this amount of gold. Therefore pay a fair price, and see that you have a label guaranteeing seven grains of pure gold in the fifteen grains of chloride. To make your stock solution of gold, measure out fifteen drachms of distilled water into a bottle. With a triangular file make a notch in the small tube of gold, drop the whole tube into the bottle, and with a glass rod bang it until it breaks, give it a good shake up, and there you are. Do not neutralise if acid, but when you measure out any for your toning bath, neutralise only that quantity.

Tone all your prints before touching hypo, if you want to keep free from annoying spots and marks on the prints. Then when they have all been toned give them a soak in a dish of water, and put away your toning bath. Get down the hypo dish and fresh mixed fixing solution, and proceed to fix them. Be sure and fix well; twenty minutes is not too long.

Use a pair of smoked glass spectacles when printing in clouds in the sun. Nothing is more blinding and injurious to the eyes than the glare of a bright sky reflected from the back of your negative, and as you must—if you want good results—keep moving the mask so as to vignette in the clouds, and keep an eye on the limits of this movement, you are obliged to look at the negative. You will find in such cases the use of these spectacles a great boon, especially for platinum work, when you generally develop at once, and the transition from the light to darkness is sudden and trying.

How to Remove Varnish from a Negative.—Sometimes a negative which has been varnished proves weak and needs intensification, or for some other reason the varnish is wanted to be—like the Turkey—hoff! Well, place the negative varnish side up in a dish and cover it with methylated spirit, and place over the dish a piece of glass, cardboard, &c., to keep the spirit from evaporating. Leave it to soak for half an hour, then take a pad of cotton wool, soak in spirit, and rub gently over the negative, the varnish will come off gradually in flakes. Continue gently rubbing until it is all off, flow over some more methylated spirit, drain and dry.

To tone with platinum, it is necessary to use other than albumenised paper, as with that the results are not so satisfactory, and the toning takes place very slowly. If, however, you must use albumenised paper, after washing the print free from silver, as usual, give it a preliminary bath of acetic acid—one drachm to six ounces water. Ordinary matt surface prints only require washing in one or two waters, and then apply the following toning solution with a brush:—

STOCK SOLUTION P.

Chloroplatinite of potassium ..	60 grs	1 gr.
Water	2 ozs.	16 ms.

To tone, take 16 minims, and make up with water to half an ounce, then add one drop of nitric acid, stir up, and tone.

To tone gelatine papers (Aristotype, Alpha, &c.), instead of using nitric acid, use

STOCK SOLUTION D.

Oxalate of potash	8 ozs.
Water	50 ozs.

For use, take of P one part, D three parts, water two parts. After toning with the acid solution, wash in a bath containing a little carbonate of soda before proceeding to fix.

To Tone Blue Prints.—The only available tones of which we know are a bluey black or indigo, brown, brownish purple, slaty blue, and blue violet, and they are produced by immersing the washed print in the following baths:—

BLUE BLACK.

Immerse in

Ammonia	1% solution

or

Bicarbonate of soda (sat. sol.)	1 part
Water	80 parts

until the desired colour is reached. The whites will be found to be bleached, however, and if the bath is too strong the whole image will be bleached.

FOR BROWN.

Washing soda	10% solution

until bleached, and then in

Tannin ..	10 grs. to the ounce of water.

FOR BROWNISH PURPLE.

First into tannin, 20 grs. to ounce, to which three drops of hydrochloric acid are added. Rinse, and treat with ten mins. of liquor potassæ to two ounces of water until it turns rusty red. Rinse, and immerse in a bath of hydrochloric acid, one drop to the ounce.

FOR BLUE VIOLET.

Carbonate of ammonia ..	2% solution.

In all cases print rather deep.

Use magnesium ribbon for copying photos, &c. Proceed as directed for copying in last year's ANNUAL, and when the focus is obtained, uncap the lens, having cut off, say, two 6 inch lengths of ribbon. Now ignite one piece, standing on one side of the camera, and while it is burning move it in a circle, of which the lens is about the centre, and about two feet distant from the lens, from above round to one side. Then do the same with the other piece on the other side. By this means the shadow thrown by the grain of the paper is obviated. Care must be taken when moving the ribbon that it is not brought where its reflection from the surface of the print, &c., may pass through the lens. This distance may be determined by placing the eye at the edge of the camera back and looking over the lens, at the same time holding a light so as to note the distance from the camera on either side at which the reflection will catch the lens. The amount of ribbon to be

burnt, of course, will vary with circumstances. For instance, if merely supplementing daylight, and you already have a side light, a piece need only be burnt on the shadow side. If copying by night, and using, say, an 8¾in. focal length lens, to copy 12 by 10 pictures to ½ plate size with stop f 8, we have found two 6 inch pieces ample, using Ilford ordinary plates.

Mounting Tips.

The choice of a mount suited to the subject is an important point with regard to which tyros do not pay sufficient heed. Articles have been written again and again on this subject by those best qualified to speak, and yet when one looks at the array of work at exhibitions, many and many a fine photograph is spoilt by its mount and frame. For general purposes, the tyro will no doubt be satisfied with the mounts which dealers have in stock, and of these we would recommend the India-tint plate-sunk mount for bromide and black platinum prints. For albumen prints French grey or cream mounts are best, and we simply hate and detest those hideous pinks and greens, while for portraits black mounts with gilt bevelled edges sometimes look well, though not always. For sepia platinum prints nothing comes up to a mount faced with paper of same tone and texture as the print itself. Another kind of mount which suits most subjects is a grey-faced cut-out mount, the edge of the cut out showing white, the print is mounted with a margin of white paper and inserted. For all enamelled, highly glazed gelatino-chloride prints nothing is better than an ordinary cut-out cardboard mount, as with these glossy darlings the gloss is everything.

How to Make Starch for Mounting Purposes.—Starch ought to be thick if it is wanted to stick, and to get it thick and yet not lumpy is the main point. We find the best way is to put a few knobs of Glenfield or other starch in a teacup, add a little warm water, and break up the starch with a spoon until it forms a smooth paste, now add hot water to about half the cupful, and then place the cup in a saucepan of boiling water and keep the water boiling, stirring the starch all the time until it *all* thickens and changes from a milky thin to a gelatinous thick fluid. Remove the cup from the saucepan, take an old handkerchief and a soup plate, spread the handkerchief over the plate, and empty the contents of the teacup into the handkerchief. When cool enough, squeeze through into the plate, and if you want it to keep, add a grain or two of salicylic acid, and it is ready for use.

Other mountants are frequently recommended, such as gelatine, glue, dextrine, &c. Thin glue (best Scotch) is useful for large sizes. The print is damped and the glue (hot) applied along the edges, the print is then lowered on to the mount and rubbed down, and when dry it will be found to lie quite flat. Dextrine mixed with hot water to smooth paste is also useful, but not so good, in our opinion, as starch. Any gelatine mountant we do not like, and for albumen and gelatine prints beware of any liquid glue, as these invariably contain acid or other deleterious substances.

The brush used for rubbing in the mountant should be stiff and not too long in the hair. We use a cheap hog's hair shaving brush, and find it all that can be desired, as not only can the mountant be vigorously



F. Thévoz & Co, Geneva

Neg. by J. R. Gotz, London

"EASHING BRIDGE"

applied, but it stands up on end, and does not, like most brushes, fall over, roll off the table, apply starch, &c., to the table; in fact, make itself generally objectionable.

Albumen prints should be mounted damp, and gelatino-chlorides or bromides be mounted dry. If a circular print-trimmer is used, the print, if albumen, can be cut while damp, and will adhere to the cutting shape (if you use one, though we do not like them), and can be pasted and applied straight from the shape. Our reasons for not liking cutting shapes are—(1st) They are rarely, if ever, a true rectangle; (2nd) the size is uniform, and will not suit every subject; and (3rd) they are not necessary, hence why get one? For mounting gelatine prints, we find it a good plan to mark the mount at each corner of the trimmed print, and then apply the mountant to the *mount*, and not the print. Of course, the print must be made to adhere all over, and for this purpose

Use a Roller Squeegee.—After the print is applied to the mount, cover with a piece of clean blotting paper, and gently roll the squeegee over it, beginning at the centre and working to the edges, so as to squeeze out all superfluous mountant, which will be absorbed by the blotting paper. If even then the edges, as sometimes happens, do not adhere, with a small brush apply more mountant between the mount and print, and squeeze again. Remember that no mountant must be allowed to get to the face of a gelatine print.

Show no unmounted prints to amateur or other friends, as finger marks always disfigure; and if the prints are unmounted, this must of necessity occur. Another reason for our advice will appear from the following little experience we had some years ago. We had passed our summer holidays on the Broads, sleeping on the yacht all the three weeks. We there met some friends who also had a yacht, and who asked us to photograph it and its dinghy. This we did, promising a few copies, "if all went well." We also used our camera on other subjects in Broadland, and on our return home prepared half-a-dozen prints of the aforesaid yacht for its owners. We had also in our album a lot of other unmounted prints of Broad subjects. Our friends arrived, admired, and annexed! Cæsar was not in it. Some three dozen prints were absorbed! We then vowed a mighty vow to "never again." These remarks also apply to lantern slides, not so much as regards annexation, as to disfiguration.

Trim your Print to Suit the Subject.—This is a most important point from an art point of view. For instance, we know a medalled picture, which was taken on a 12 × 10 plate, but the print is cut down to 11 × 7, with most satisfactory results. Because you use a 10 × 8 camera, your print need not necessarily be eighty square inches in area; probably in most cases just half that will give you a far more artistic picture. Many amateurs are so afraid of losing a bit of their print; they keep in all that blank sky, or all that grass in the foreground, whereas an inch or two cut off top or bottom would make a picture out of what otherwise is merely a pretty view. We lately made a fair picture, by cutting down a half-plate view to 4 × 2½, of what otherwise was merely a view of an old farmhouse.

E

Tips on Lantern Matters.

Exposing lantern plates by contact is not so easy as it may appear at first sight. To get a good slide the exposure must be made to balance the development. For most average negatives there is nothing, in our opinion, to come up to magnesium ribbon, as by varying the distance, increase or the reverse of exposure may be given, while there is a great economy in time. Now, in order to gauge the necessary exposure for the particular brand of plates you use, all you have to bear in mind is that one inch of magnesium ribbon burned at three feet from the negative is equivalent to 30 secs. exposure at one foot from the ordinary Bray burner. To get black tones, then, this distance is the correct one for all plates for which 30 secs. at one foot is given as the correct exposure in the instructions sent out by each maker. To vary this to suit other plates you have only to calculate distance for magnesium against time for gas, thus—

Magnesium.	Gas.
1 inch at 3 ft.	= 30 secs. at 1 ft.
1 inch at 2 ft.	= ($\frac{3}{4}$ × 30 secs. =) 67 secs. at 1 ft.
1 inch at 1 ft.	= 270 secs. at 1 ft.

and so on, remembering that the exposure varies inversely as the distance squared. Of course, for thin negatives the distance must be proportionately increased. While for very slow plates, such as Alpha warm tone, one inch at about seven inches is not too much. Most lantern plates, however, allow of great latitude of exposure *provided* the developer is proportionately compounded, the only difference being in tone.

To make lantern slides by reduction is, in our opinion, by far the best way, even though the negative be a quarter-plate. There is a something in a slide by reduction which a contact slide lacks, and no doubt this is due to the fact that the former is made by the agency of daylight. Now, although there are many cameras sold for the purpose, there is no real need to buy one. If you have a quarter-plate camera and a wooden box sufficiently large, a little management will be all that is required. We will suppose you wish to get a slide from a half-plate negative. The lens (preferably a 5 × 4 RR or WAR) of the quarter-plate camera has a focal length, say, of x inches, and on your slide you require to get all the view on the half-plate negative, *i.e.*, a reduction of two dimensions linear measurement. We now calculate the length your box must be from the well-known formula:—

$$\text{Distance from lens to negative} = (n + 1)\,x$$

where n = number of times reduction (or enlargement) required, and we have, therefore, length of box is $3x$, or if x is 5 inches, box must be 15 inches. In the bottom of the box we cut a central aperture to take our negative, and in the opposite side a central hole to take our lens of the camera; propping the latter up to the right height, we focus our negative on the ground glass of the camera, see that it is sharp and central, and all vertical lines *are vertical*. Then in our dark slide we insert two pieces of wood $\frac{1}{2}$in. wide and $3\frac{1}{4}$ long, and just thick enough to fit the slide when closed, one at each end, and between them put our lantern plates. The box and camera are for convenience sake mounted on a long board, and this is tilted so that

the negative is illuminated by the open sky; we put in the dark slide and expose, say, for one minute. Then develop and see if our exposure is about right. To give some idea, we ourselves use a 5 × 4 portable symmetrical of 3¾in. focal length and from half-plate to lantern size; we find from 40 secs. to 2 min. is about the range of exposure, using f/11 stop.

Developing Gelatine Slides.—The developers usually given in the instructions are supposed to suit the particular plates, but if the tyro wants a simple developer which gives fine warm sepia tones, let him make up for stock solutions some 10% sulpho pyro (for which *vide Photography*, Vol. II., p. 809), 10% bromide of ammonium, 10% caustic potash, and 10% carbonate of ammonium. These are solutions which are used in almost all instructions. Now of these to form our pet devoleper take

Pyro	30 drops
Bromide	30 drops
Potash	50 drops
Carbonate	60 drops
Water to	1 oz.

Of course, this is only intended for gelatino-bromide plates.

Toning Slides.—In some cases toning a slide is a necessity. For instance, when either the colour is unpleasantly red or brown, or when from too flat a negative, or under-development, only a poor slide results. For Alpha plates, the best toning bath is that used for Alpha paper, and is a combined toning and fixing bath. It is as follows:—

Water	ozs.
Hypo	2½ ozs. (avds.)
Acetate of soda	½ oz.
Sulphocyanide of ammonium	¼ oz.
Chloride of gold	4 grains.

to be dissolved in the order named. For bromide plates, the following bath is capital:—

Sulphocyanide ammonium	¼ oz.
Carbonate of ammonium	20 grs.
Water	20 ozs.

When dissolved, add

Chloride of gold	8 grs.
Water	4 ozs.

This lasts well, and may be used over and over again.

Printing in clouds on contact lantern slides is a fairly easy process. The best way is to have two strips of paper on the opposite sides of the printing frame, with quarter-inch marks along them; then when printing in the view note the marks corresponding to the landscape part of the negative. Now take out the negative and insert the cloud negative, and cover it over from mark to mark with cardboard and expose to gaslight, moving another piece of card up and down to avoid a hard line. Of course, the latter exposure must be short compared to the exposure for the view. Then develop as usual. Another way is to have the view on one lantern plate and the

clouds on the *cover plate*, and mount them face to face; but in this case note that the clouds will be reversed, and hence in the cloud negative the lighting must be in the opposite direction to what it is in the view. And one great point is *not* to have the *same cloud on every slide.*

Clearing Slides.—This is nearly always necessary to give sparkle and brilliancy. For general use Edwards's iron clearing solution is the best.

Proto sulphate of iron	3 ozs.
Alum	1 oz.
Citric acid	1 oz.
Water	20 ozs.

Take the slide out of the fixing bath, and, without rinsing, immerse in the clearing solution until the desired effect is attained. But this iron bath has a considerable effect on the colour of the slide, generally cooling it to a great extent, and, if the action be prolonged, making it a lurid blue. Therefore, note this in reference to moonlight effects. Ferricyanide of potassium in conjunction with hypo is another powerful clearer, but is somewhat dangerous, as it is very apt to be too energetic. However, we personally use it with a brush, to clear up water and sky effects.

Surface Paper for Masks.—Most people have a habit of using black paper masks. Why, we do not know, as black paper is disagreeable to write upon, and then it must be with white ink. A better plan is to use a paper which is white on one side, as it is more convenient to write upon. This paper can be bought at the stationer's under the name of surface paper, and can be obtained in various colours.

Cutting shapes of zinc or brass are most useful, as frequently it happens that the ready-cut masks are not quite suitable for the desired effect. In conjunction with these shapes and a revolving wheel cutter for cushion or round shapes, any subject can be suitably masked. But remember that knives, &c., must be sharp, as nothing is more painful than jagged edges on the screen. These shapes can be obtained from the dealer's, and brass are better *and dearer* than zinc.

To Make White Ink.—Procure one ounce of barium sulphate (precip.) from the chemist's (Hopkin & Williams list it at 1/- per lb), or precipitate chloride of barium with any sulphate or sulphuric acid, and wash it. To this white powder add some thin gum arabic solution, and mix up until thick enough to flow from the pen easily, and yet, when dry, to be quite white. Instead of barium sulphate you may mix zinc white if it is more convenient.

How to Mark your Slides.—Nothing enrages the poor lantern-manipulator more than to have a lot of unmarked slides to pass through. The derisive jeers, too, which greet the slides when they appear recumbent or standing on their heads do not tend to make him sweeter tempered. One mark in the corner is not sufficient, as the corner may be put right or left. The proper way to mark your slides is to place on the mask two round or square dots—white, if the mask is black or coloured, and black if the mask is white—*above* the picture, *one at each corner*. Then when the lanternist takes them he places the dots *down*, and facing the condenser, and you have the

satisfaction of seeing *your* slides, anyhow, shown the right way up. To make these round dots, buy a round saddler's punch, size No. 7; get some gummed stamp paper, and punch through six or eight thicknesses at a time. Thus in a very short time you can get a sixpenny box of dots for merely the cost—usually *nil*—of the stamp paper. The punch costs sixpence.

To bind slides we prefer to use white paper, cut into strips about three-eighths of an inch wide and fourteen inches long. We place these on a piece of newspaper, one by one, as we use them, and apply with a short-haired stiff brush Lepage's liquid glue. Remove the strip to a clean piece of paper, to obviate sticking, and then apply the slide with cover-glass along the centre of the slip at its end, and so that the lap of the whole slip may come either at the top or bottom of the slide. This is to save it coming undone when placing in the grooves of the box. When dry, clean with a moist cloth and polish with a clean wash leather. *Note.*—Always clean your slides before showing them. Now to end up this series of tips, we address two to those tyros who are not utterly alarmed at something they have not tried before. We are firmly convinced that if they master the technicalities of these two tips for collodion slides, they will only use gelatine as a "*faute de mieux*," and although the emulsion can be purchased, yet, as we said last year, there is a great feeling of self-satisfaction in the thought, "I made it myself."

To Make a Collodio-bromide Emulsion.—The first requisites to success are cleanliness and accuracy. Then we want the following materials:—Pyroxyline, high temperature (Thomas', Rouch's, Hopkin and Williams, or any other standard cotton, *but* this is the difficulty, viz., to get good pyroxyline, and when you get a good sample, stick to it!), methylated spirit (not finish, but Hopkin and Williams, of Cross Street, Hatton Garden, sell a good sample), methylated ether s g. ·725 (get this as fresh as possible, as by itself it will not keep), nitrate of silver (pure recrystallised), bromide of ammonium (this must be *quite freshly made*, so apply to manufacturing chemists for it) and bottles. Now to make the emulsion. Weigh out 60grs. of pyroxyline, and into a 15oz. bottle (or larger) measure out 3oz. of alcohol, insert the pyroxyline, and when soaked pour in 2½ozs. of ether and shake. All the cotton should dissolve, yielding a limpid collodion. If there is any appearance of cloudiness, leave the collodion for a few days and it will settle, then decant the clear liquid. Having this, we proceed to bromise it by adding to it

Ammonium bromide	65 grains	Dissolved with heat in a test tube.
Water	90 minims	
and then add alcohol	1 oz., the whole to be	

added to the collodion and well shaken up. Now we prepare the silver solution by dissolving with heat in a test tube

Silver nitrate	100 grains in
Distilled water	1 dram.

Now in the dark room add the silver to the collodion as follows:—Pour in a drop or two, cork and shake. Then a few drops more, and more shaking, and so on until all the silver has been added. Wash out the test tube with a little alcohol and add this to the emulsion. Then shake vigorously for about five

minutes. Pour a drop or two of the creamy looking emulsion on to a clean glass plate, put away the emulsion in a dark box (we find a 1lb. tobacco tin a capital store box for the bottle), and examine the drop or two on the glass plate by gaslight. It should, if all be right, be a fine orange or ruby colour. Leave the emulsion to ripen for 24 hours, giving it an occasional shake. Then evaporate it in the dark room in a flat dish until it becomes the consistency of a blanc mange, break it up into small pieces, and proceed to wash it thus. Place the pieces in an old handkerchief and immerse in water for quarter hour. Take out and squeeze all water out, and immerse in a fresh lot of water. Leave it for half an hour or so, and then squeeze out again. Do this five or six times in the course of six hours, and then test a drop of the liquid squeezed out with bichromate of potash, if no red coloration is producen, the emulsion is washed. Now it has to be dried, or rather freed from water, by placing it in a jar and covering with methylated alcohol for half an hour, then squeeze out and place it again in more alcohol, another squeeze, and half an hour more alcohol, and it is ready for redissolving. Place it in a 20oz. bottle and pour over it 4oz. of methylated alcohol and 4oz of ether, and shake for five minutes, then wrap it up in two or three coatings of brown paper, and carry it about, or give it a shake every now and then for about two or three hours. Then proceed to filter it into its final bottle, a 10oz. one. Get a piece of stiff paper (thick note does well), twist it into a sugar-loaf shape and pin it near the broad end. In the cone thus made insert a piece of cotton wool, moisten it with alcohol to get rid of loose fibres, and then pour in your emulsion after a good shake. It will run through quite quickly, and your emulsion is finished and ready for use.

JAMES SWIFT & SON,

MANUFACTURING PHOTOGRAPHIC OPTICIANS

To H.M. Government, and Science and Art Department, South Kensington.

SEVEN GOLD MEDALS AWARDED.

The combinations of all the Lenses manufactured by J. Swift & Son are made from the new Abbe Schott Optical Glass.

LANTERN PROJECTION LENSES.

Special Projection Lenses for the Optical Lantern, from 4in. focus upwards. 5in., £4. 6in. £5. These Lenses are undoubtedly the most perfect made for the purpose they are intended.

NARROW-ANGLE TRIPLE LANDSCAPE LENSES.

For Photographing Mountainous Scenery and extremely distant Landscapes.

To Cover ...	5 x 4	6 x 5	8½ x 6½	9 x 7	10 x 8	12 x 10	13 x 11	15 x 12	18 x 16
Equiv. Focus	9in.	11in.	16in.	18in.	20in.	22in.	22in.	25in.	28in.
PRICE	£2 19	£3 5	£4 10	£4 15	£5 9	£6 16	£7 0	£7 19	£9
With Iris Diaph.	3 14	4 0	5 5	5 10	6 4	7 13	7 17	8 19	10

WIDE-ANGLE TRIPLE LANDSCAPE LENSES.

For Views where extreme angle is required.

To Cover ...	5 x 4	6 x 5	7½ x 5	8½ x 6½	10 x 8	12 x 10	15 x 12	18 x 16	22 x 20
Equiv. Focus	5½in.	6in.	7in.	8½in.	10in	12in.	15in.	18in.	22in.
PRICE	£2 19	£3 2	£3 5	£4 1	£4 19	£6 6	£7 19	£9 9	£12 12
With Iris Diap.	3 14	3 19	4 3	4 19	5 14	7 2	8 14	10 10	13 13

PORTABLE "PARAGON" LENSES.

Giving either wide, medium, or ordinary angle, according to the stop used.

To Cover	3 x 3	4 x 3	5 x 4	7½ x 4½	8 x 5	8½ x 6½	9 x 7	10 x 8	12 x 13	13 x 11
Equiv. Focus	3in.	4in.	5in.	6in.	7in.	8in.	9in.	10in.	12in.	15in.
PRICE	£2 14	£2 18 6	£3 3	£3 12	£4 10	£5 8	£6 6	£7 4	£8 2	£9 18
With Iris Diap.	3 9	3 13 6	3 18	4 7	5 5	6 3	7 1	7 19	8 17	9 9

RAPID "PARAGON" LENSES.

For Landscapes, Interiors, Architectural Subjects, Copying, Instantaneous Effects, Portraits, and Groups Outdoors.

To Cover...	3 x 3	4 x 3	5 x 4	6 x 5	8 x 5	8½ x 6½	9 x 7	10 x 8	12 x 10	15 x 12	18 x 16
Equiv. Focus	3in.	4½in.	6in.	7½in.	9in.	11in.	12in.	14in.	16in.	20in.	24in.
PRICE	£3 3	£3 12	£3 16	£4 14 6	£5 3 6	£5 17 6	£6 15	£7 12	£9 9	£13	£16 13
With Iris Diaph.	3 18	4 7	4 11	5 9 6	5 18 6	6 12 6	7 10	8 7	10 9	14 5	18 5

WIDE-ANGLE "PARAGON" LENSES.

Giving nearly 100 degrees of angle, for Photographing Interiors and Architectural Subjects in extremely cramped positions.

To Cover...	3½ x 3¼	5 x 4	7½ x 4½	8½ x 6½	12 x 10	15 x 12	18 x 16	22 x 20
Equiv. Focus	2½in.	3in.	4in.	5¼in.	7in.	8½in.	13in.	15½in.
PRICE	£3 12	£3 12	£4 1	£4 19	£6 19	£9 9	£12 12	£18
With Iris Diaph.	4 7	4 7	4 16	5 14	7 14	10 4	13 17	19 17

For Particulars of other makes of Lenses, Tourists' & other Cameras, write for Catalogue.

The Iris Diaphragm fitted to above Lenses is Patented.

Ten per cent. is allowed off price of each Photographic Lens for Cash with Order.

The above Lenses can be had mounted in aluminium, for prices see Catalogue.

UNIVERSITY OPTICAL WORKS,

18, Tottenham Court Road, LONDON, W.

DARK ROOM FOR AMATEURS.

BRIGHTON

HARDCASTLE & CO.,
Photo Chemists & Dealers in Photographic Apparatus,
71, East Street, Brighton.

HARDCASTLE'S

Printing-out Platinum Paper

NO Failures
NO Developing
NO more Toning
NO Process so simple
NO Prints so Permanent
NO Results so beautiful
NO Engraving more Perfect
NO Effects more admired
NO Dealer should fail to Stock it
NO Amateur should be without it

HARDCASTLE

WILSON NOBLE, M.P., says:—"It certainly works admirably, and the colour is very good."

LADY DOWDSWELL says:—"It is charmingly simple, and so beautiful."

H.G. says:—"I am delighted with the fine results I got on your Paper. The blacks are perfect."

Gold Medal awarded for PURE CHEMICALS and PHOTOGRAPHIC OUTFITS.

In consequence of the **Material Improvements** made in this Paper, since January, we are compelled to revert to the old prices, viz.,

Quarter-plate	**1/- per doz.**	**8 × 10**	**6/6 per doz.**
Cabinets	**1/6 ,,**	**12 × 10**	**10/- ,,**
Half-plate	**2/- ,,**	**15 × 12**	**12/- ,,**
Whole Plate	**3/6 ,,**	**Full Sheets, 18 · 25**	**2/6 each.**

HARDCASTLE'S "NEW" DEVELOPER

Supersedes all others, in two solutions, price **2/-** and **3/6.**

HARDCASTLE & CO., Photo Chemists and Dealers,

71, EAST STREET, BRIGHTON.

SEND FOR CATALOGUE

Section III.

THE ANNALS

OF

PHOTOGRAPHY

BEING

A RECORD OF PROGRESS

IN THE

SEVERAL BRANCHES

OF THE

SCIENCE AND PRACTICE OF PHOTOGRAPHY

During the Year 1891.

ILIFFE & SON'S
PHOTOGRAPHIC PUBLICATIONS

PHOTOGRAPHY. Edited by HENRY STURMEY, F.S.Sc. The oldest penny Photographic Paper in the World. The Journal of the Amateur, the Profession, and the Trade. EVERY THURSDAY. Price 1d.; post free 1½d.

"PHOTOGRAPHY" ANNUAL. Edited by HENRY STURMEY, F.S.Sc. An illustrated compendium of information and statistics. Published early in May each year. Demy 8vo. Price 2s. 6d., cloth 3s. 6d.; postage 4½d.

THE ENCYCLOPÆDIA OF PHOTOGRAPHY. By WALTER E. WOODBURY, with over 1,000 References, and illustrated with 200 explanatory diagrams and sketches. Cloth bound. Price 7s. 6d.; postage 6d.

PHOTOGRAPHY FOR ALL. An Elementary Text Book and Introduction to the Art of Taking Photographs. By W. JEROME HARRISON, F.G.S. Sewed 1s.; post free 1s. 2d.

THE INTERNATIONAL ANNUAL OF ANTHONY'S PHOTOGRAPHIC BULLETIN. Edited by W. JEROME HARRISON and A. H. ELLIOTT. Published in June each year. Price 2s.; post free 2s. 4½d.

COLLOTYPE AND PHOTO-LITHOGRAPHY. By Dr. JULIUS SCHNAUSS. Translated with the sanction and assistance of the author by E. C. MIDDLETON. Together with all the original illustrations, and an appendix on Steam Presses by the Translator. Price 5s.; post free 5s. 4½d.

THE PROCESSES OF PURE PHOTOGRAPHY. By W. K. BURTON, C.E., and ANDREW PRINGLE. A standard work, very complete, and freely illustrated. Price 4s. 6d.; post free 4s. 10d.

PRACTICAL PHOTO-MICROGRAPHY BY THE LATEST METHODS. By ANDREW PRINGLE, F.R.M.S., President of the Photographic Convention of the United Kingdom, 1889. Price 10s. 6d.; post free 11s.

THE PHOTOGRAPHER'S INDISPENSABLE HANDBOOK, 1887. A complete Cyclopædia upon the subject of Photographic Apparatus, Material, and Processes. Compiled by WALTER D. WELFORD; Edited by HENRY STURMEY. Price 2s. 6d.; post free 2s. 10½d.

THE INDISPENSABLE HANDBOOK TO THE OPTICAL LANTERN, 1888. A complete Cyclopædia on the subject of Optical Lanterns, Slides and Accessory Apparatus. Compiled by WALTER D. WELFORD; Edited by HENRY STURMEY. Price 2s. 6d.; post free 2s. 10½d.

AN INTRODUCTION TO THE SCIENCE AND PRACTICE OF PHOTOGRAPHY. By CHAPMAN JONES, F.I.C., F.C.S., Senior Demonstrator of Practical Chemistry in the Royal College of Science. New and Revised Edition. Sewed 2s. 6d., cloth 3s. 6d.; postage 4½d.

PHOTOGRAVURE. By W. T. WILKINSON. A complete Text Book on the subject; with illustrations. Price 1s. 6d.; post free 1s. 7d.

MATERIA PHOTOGRAPHICA. By C. J. LEAPER, F.C.S. A treatise on the manufacture, uses and properties of the substances employed in photography. Crown 8vo. Cloth, 250 pages, largely illustrated. Price 5s.; post free 5s. 4½d.

THE FIRST PRINCIPLES OF PHOTOGRAPHY. By C. J. LEAPER, F.C.S., author of "Materia Photographica." Crown 8vo., cloth. Price 5s.; post free 5s. 4½d.

PHOTOGRAPHY SIMPLIFIED FOR ARCHITECTS. By F. W. MILLS, author of "The Art and Practice of Interior Photography." Demy 8vo., cloth, Illustrated. Price 2s. 6d.; post free 2s. 9d.

MILITARY PHOTOGRAPHY. By O. E. WHEELER, late Captain 1st Leicestershire Regiment. Price 1s. 6d.; post free 1s. 7½d.

PHOTOGRAPHIC PASTIMES. By HERMANN SCHNAUSS. Containing particulars of many curious effects to be obtained with the aid of the Camera. Crown 8vo. Price 1s.; post free 1s. 2d.

PRACTICAL ENLARGING. By JOHN A. HODGES, Vice-president West London Photo Society. Paper Covers 1s., cloth 2s.; postage 3d.

THE HAND CAMERA. By WALTER D. WELFORD, compiler of "The Photographer's Indispensable Handbook," etc. *[In preparation.*

LONDON: ILIFFE & SON, 3, ST. BRIDE ST., E.C.

W. WATSON & SONS,

Opticians to Her Majesty's Government.

ESTABLISHED 1837.

OFFICES AND WAREHOUSES:

313, HIGH HOLBORN, LONDON, W.C.

AND

78, Swanston Street, Melbourne, Australia.

STEAM FACTORIES:

9, 10, 11, 16 & 17, FULLWOOD'S RENTS, HOLBORN, W.C.

Manufacturers of and Dealers in every Description of

HIGHEST CLASS

Photographic Instruments

AND APPARATUS.

—*—

28 PRIZE MEDALS AWARDED,

Including Highest Awards at Glasgow, 1891; Amsterdam, 1891; and Budapesth, 1890; two Gold Medals, Paris, 1889; the Medal of the Photo Society of India, at Calcutta, 1889; the Gold Medal, Melbourne International Exhibition, 1888; the only Medal for Cameras, and the only Medal for Studio and Tripod Stands, at the Great Photographic Exhibition, Crystal Palace, London, 1888; the only Medal for Photographic Apparatus, Adelaide International Exhibition, 1887, and the only Gold Medal for Photographic Apparatus, Liverpool International Exhibition, 1886.

Five times placed alone at International Exhibitions, receiving a higher award than any other competitor.

A Fully Illustrated and Descriptive CATALOGUE of Cameras, Lenses, and every Accessory, Apparatus, and Material requisite in Photography, sent post free to any part of the world on application.

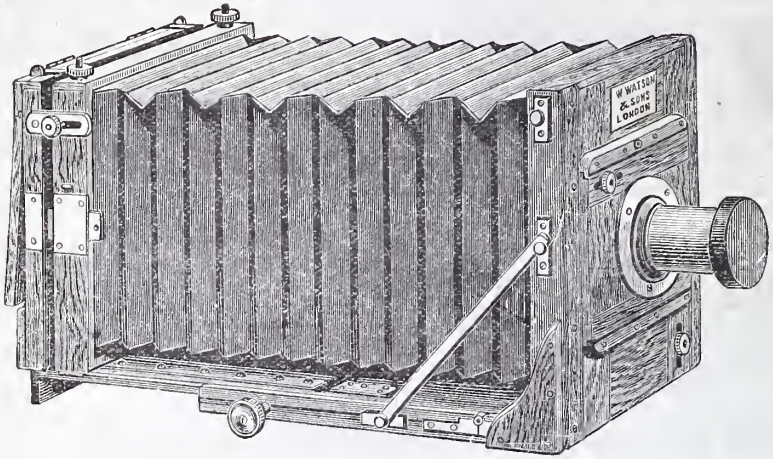
EVERY PHOTOGRAPHER SHOULD POSSESS A COPY OF THIS LIST.

—*—

The Quality of our Goods is the very highest obtainable, and being actual Manufacturers (and this probably on a larger scale than any other House in Europe) we are able to supply to purchasers goods of the very fullest value for the sums expended—we venture to say in regard to Cameras and Lenses, of unequalled value, of which fact an inspection of our goods, where practicable, will give speedy conviction.

W. WATSON & SONS, 313, High Holborn, London, W.C.

WATSON & SONS' PREMIER CAMERAS



Watson's 'Premier' Cameras have Double Extension to Focus, giving very long range, Double Swinging Back, Rising and Falling Front. The Dark Slides, Fronts, Clamping Screws, and Nuts made to standard gauges so as to be interchangeable in the various sizes, while extra ones can at any time be supplied without the necessity of sending the Camera to fit them. This model Camera is probably the most practical and useful for all-round work ever designed, and the demand for it has increased steadily since its introduction in 1883. Made only in the very highest quality and workmanship.

PRICE LIST.

	6½ x 4¾	7½ x 5	8½ x 6½	10 x 8	12 x 10	15 x 12	18 x 16
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cameras and three Double Slides ...	9 12 0	10 0 0	12 5 0	14 0 0	16 12 6	21 0 0	31 10 0
Rapid Rectilinear Lens, with Iris Diaphragm	4 0 0	4 10 0	5 0 0	6 15 0	8 15 0 (2 cases)	11 10 0	16 0 0
Solid Leather Travelling Case, with Spring Lock ...	1 15 0	1 15 0	2 2 0	2 15 0	4 4 0	6 15 0	8 15 0
Folding Tripod Stand	1 5 0	1 5 0	1 10 0	1 10 0	2 2 0	2 10 0	3 3 0
Instantaneous Shutter, with Pneumatic Release... ...	1 0 6	1 0 6	1 3 6	1 7 6	1 12 6	1 12 6	2 2 6
	17 12 6	18 10 6	22 0 6	26 7 6	33 6 0	43 7 6	61 10 6
Extra if Camera and Slides are Brass Bound, for India ...	1 10 0	1 10 0	1 15 0	2 0 0	2 10 0	3 0 0	4 0 0
Extra for adding Repeating Back for Portraiture, to take two Pictures on one Plate, as with an Universal Studio Camera	2 0 0	2 0 0	2 10 0	3 3 0	3 10 0	4 0 0	5 0 0
	21 2 6	22 0 6	26 5 6	31 10 6	39 6 0	50 7 6	70 10 6

Any item in above estimates may be purchased alone, or left out from the set if desired, and cost deducted. The prices are subject to ten per cent. discount for cash with order.

EXTRA DOUBLE BACKS FOR CAMERAS.

FITTED WITH PATENT STOPS AND PATENT SPRINGS TO SHUTTERS.

Sizes	4¼ x 3¼	5 x 4	6½ x 4¾	7½ x 5	8½ x 6½	10 x 8	12 x 10	15 x 12
Prices	15/-	17/-	£1 0 0	£1 1 0	£1 3 6	£1 10 0	£1 16 0	£2 10 0
Brass Binding extra	3/6	3/6	3/6	3/6	4/-	5/-	5/6	6/-

INNER FRAMES, for Smaller Size Plates, measured outside.

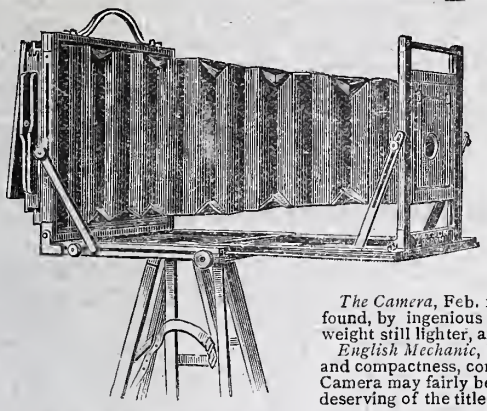
Prices	1/6	1/9	2/-	2/3	2/6	3/-	4/-

The above prices are subject to 10 per cent. discount for cash with order.

NOTE.—The above Cameras are also kept in stock in the leading sizes used on the Continent —18 x 13 c/m. costing the same as 7½ x 5; 21 x 15 c/m. the same as 8½ x 6½; 24 x 18 c/m. the same as 10 x 8; and 30 x 24 c/m. the same as 12 x 10.

Watson's "Acme" Cameras

INTRODUCED 1889.



Opinions of the Press.

British Journal of Photography, Jan. 4, 1889—"It folds into a smaller compass, and is lighter and more portable than any pattern we have yet seen."

Amateur Photographer, Jan. 7, 1889.—"A wonderful, compact, and fairy-like instrument, exhibiting several new and important features. Sure to be a favourite with tourist photographers."

Photography, Jan. 17, 1890.—"One of the greatest advances in camera construction yet reached, away ahead of anything we have seen."

The Camera, Feb. 1, 1889.—"Messrs. Watson have found, by ingenious modifications, how to make the weight still lighter, and the rigid still more firm."

English Mechanic, March 1, 1889.—"For portability and compactness, combined with practical utility, this Camera may fairly be said to take the lead, and to be deserving of the title 'Acme.'"

This Camera also received highest awards at Budapesth Exhibition, 1891; Glasgow, 1891; and Amsterdam, 1891.

PRICE LIST.

	English Inches.										Centimetres.									
	6½×4¾		7½×5		8½×6½		10×8		12×10		15×12		13×18		21×15		18×24		30×24	
	£	s.	£	s.	£	s.	£	s.	£	s. d.	£	s.	£	s.	£	s.	£	s.	£	s. d.
"Acme" Camera and three double slides	9	12	10	0	12	5	14	0	16	12 6	21	0	10	0	12	5	14	0	16	12 6
Rapid Rectilinear Lens with Iris Diaphragm	4	0	4	10	5	0	6	15	8	15 0	11	10	4	10	5	0	6	15	8	15 0
Solid Leather Travelling Case, with spring lock ...	1	15	1	15	2	2	2	10	3	0 0	3	15	1	15	2	2	2	10	3	0 0
Rotating Turn-table in base and Tripod Stand ...	2	2	2	2	2	2	2	10	2	15 0	3	3	2	2	2	2	2	10	2	15 0
	17	9	18	7	21	9	25	15	31	2 6	39	8	18	7	21	9	25	15	31	2 6

Special Notice.—The fittings of cameras usually supplied in brass work may now, if desired, be made in aluminium, which makes a great reduction in the weight of the apparatus. The metal used is alloyed to make it exceedingly tough and strong—it has the appearance of silver, but keeps its colour and does not tarnish as silver does.

Sizes.		Premier Cameras.	Acme Cameras.	
Inches.	Centimetres.	With full Aluminium Fittings.	Replacing Brass Turn-table and Ring by Aluminium.	Full Aluminium Fittings, including Turn-table.
		£ s. d.	£ s. d.	£ s. d.
6½ × 4¾ / 7½ × 5	18 × 13	3 0 0	0 15 0	3 0 0
8½ × 6½	21 × 15	3 10 0	1 0 0	3 10 0
10 × 8	24 × 18	4 10 0	1 5 0	4 0 0
12 × 10	30 × 24	5 0 0	1 10 0	5 0 0
15 × 12	33 × 27	6 0 0	1 15 0	6 0 0

Prices are subject to 10 per cent. discount for Cash with order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

WATSON & SONS PHOTOGRAPHIC LENSES.

These are made throughout in our Holborn factory, and are of the very highest efficiency, having the excellent qualities of crispness of image, rapidity, and depth of focus combined in an eminent degree according to their various forms; while our system of inspection, and the care exercised in supervision, will ensure that nothing leaves our establishment that does not attain our very high standard of excellence. We have also largely introduced the use of Aluminium for Lens Mounts, which makes an enormous reduction in the weights, especially of the larger Lenses. The extra cost for mounts in this material will be found marked against each. The metal used is not pure Aluminium, but an alloy, which, while not affecting its lightness, makes it exceedingly tough, and so strong enough to stand the wear and tear of general Lens use, which pure aluminium fails to do satisfactorily.

WATSON'S RAPID RECTILINEAR LENSES.

For Groups, Views, and all kinds of Outdoor Photography

	In Rigid Mounts.				With Cases of Waterhouse Diaphragms.	If with Iris Diaphragm instead of Waterhouse Stops.	Aluminium Mounts with Iris Diaphragm.
	Size of Plate.			Equiv.			
	Inches.	C'metres.	Diam.	Focus.	Prices.	Prices.	Prices.
1370	4¼ x 3¼	9 x 12	¾ in.	5 in.	£2 10 0	£2 17 6	£3 12 6
1371	5 x 4	...	1 ,,	6 ,,	2 15 0	3 2 6	4 0 0
1372	6½ x 4¾	...	1½ ,,	8 ,,	3 10 0	4 0 0	5 5 0
1373	8 x 5	13 x 18	1⅝ ,,	8½ ,,	4 0 0	4 10 0	5 15 0
1374	8½ x 6½	21 x 15	1½ ,,	11 ,,	4 10 0	5 0 0	7 0 0
1375	10 x 8	24 x 18	2 ,,	13½ ,,	6 0 0	6 15 0	8 10 0
1376	12 x 10	30 x 24	2½ ,,	16 ,,	8 0 0	8 15 0	11 0 0
1377	15 x 12	33 x 27	2⅞ ,,	20 ,,	10 10 0	11 10 0	15 0 0
1378	18 x 16	...	3 ,,	24 ,,	15 0 0	16 0 0	22 10 0
1379	22 x 20	...	3½ ,,	30 ,,	22 0 0	23 10 0	31 10 0

Nos. 1370 and 1371 may be had accurately paired for Stereoscopic Work

WATSON'S WIDE-ANGLE RECTILINEAR LENSES.

	Sizes.		Equiv. Focus.	With Rotating Stops.	With Iris Diaphragm.	Aluminium Mounts with Iris Diaphragms.
	Inches.	C'metres.				
1400	5 x 4	9 x 12	3 in.	£3 0 0	£3 7 6	£3 17 6
1401	6½ x 4¾	13 x 18	4 ,,	3 0 0	3 17 6	4 10 0
1402	8½ x 6½	21 x 16	5½ ,,	4 0 0	4 10 0	5 15 0
1403	10 x 8	24 x 18	6½ ,,	5 0 0	5 10 0	7 0 0
1404	12 x 10	30 x 24	8⅓ ,,	6 0 0	6 15 0	8 0 0
1405	15 x 12	33 x 27	12 ,,	7 10 0	8 5 0	10 10 0
1406	18 x 16		15 ,,	10 10 0	11 10 0	14 0 0

No. 559 may be had accurately paired for Stereoscopic Work.

WATSON'S WIDE-ANGLE SINGLE LANDSCAPE LENSES.

Yield Exceedingly Brilliant Pictures. For Pure Landscape Unsurpassed.

	Sizes.		Focus.	Rotating Stops.	Iris Diaphragms.
	Inches.	C'metres.			
1409	5 x 4	9x12	6 in.	£1 15 0	£2 5 0
1410	6½ x 4¾	13x18	7½ ,,	2 10 0	3 0 0
1411	8½ x 6½	21x15	9 ,,	3 0 0	3 10 0
1412	10 x 8	24x18	10 ,,	3 15 0	4 5 0
1413	12 x10	30x24	12 ,,	4 10 0	5 5 0
1414	15 x12	33x27	15 ,,	5 10 0	6 10 0

No. 1409 may be had accurately paired for Stereoscopic Work.

The above Prices are subject to 10 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

WATSON'S PREMIER LENSES.

Suitable for rapid Outdoor Work, Moving Objects, &c., or Groups and Large Portraits in the Studio. Exceedingly rapid, and with very flat field.
Working aperture, *f*/5·6.

IN RIGID MOUNTS, WITH IRIS DIAPHRAGMS.

	Sizes of Plates.		Diameter.	Equiv. Focus.	Mounted in Brass.	Aluminium.
	English Inches.	Centimetres			Prices.	Prices.
1381	6½ x 4¾	13 x 18	1½ in.	8in.	£7 0 0	£9 0 0
1382	8¼ x 6½	21 x 15	2 1/10 ,,	11 ,,	9 0 0	11 0 0
1383	10 x 8	24 x 18	2½ ,,	13 ,,	12 0 0	15 0 0
1384	12 x 10	30 x 24	3 ,,	16 ,,	16 10 0	22 0 0
1385	15 x 12	40 x 30	3 6/10	20 ,,	25 0 0	31 10 0

Larger sizes to order.

WATSON'S PORTABLE RECTILINEAR LENSES.

For Landscape, Architecture, and Copying, giving Wide or Medium Angle according to the stop used.

Nos.	Sizes of Plates.		Equivalent Focus.	Prices with Iris Diaphragm.
	English Ins.	Centimetres.		
1391	5 x 4	12 x 9	5 inches.	£3 10 0
1392	6½ x 4¾	...	6 ,,	4 0 0
1393	8 x 5	13 x 18	7 ,,	5 0 0
1394	8½ x 6½	21 x 15	8 ,,	6 0 0
1395	10 x 8	24 x 18	10 ,,	7 0 0
1396	12 x 10	30 x 24	12 ,,	8 10 0

All the above Lenses have their Mounts alike, and fit into the same size flange, 1½in. diam.

FOCUSSING GLASSES.

1456.	Focussing Glasses, plain ... ... acb	0 3 6
1457.	Ditto, ditto, with Adjustment and Clamping Screw ... ... ,,	0 7 6
1458.	Ditto, ditto, best quality ... ... 8s. 6d. and	0 10 6
1459.	Ditto, ditto, to show the magnified image erect; recommended for Portraiture	0 15 0

The above Prices are ubjec to 10 per cent. Discount for Cash with Order.

IRIS DIAPHRAGMS.

Entirely superseding Loose Stops, as they avoid risk of losing Stops, or fogging plates through light entering the Slot.

WATSON'S PATTERN, giving perfectly circular aperture, are kept on hand in all sizes, and may be promptly fitted to any Lens without need of cutting the tube, being placed inside the tube and regulated by a pin through the ordinary diaphragm slot.

PRICES (Net).

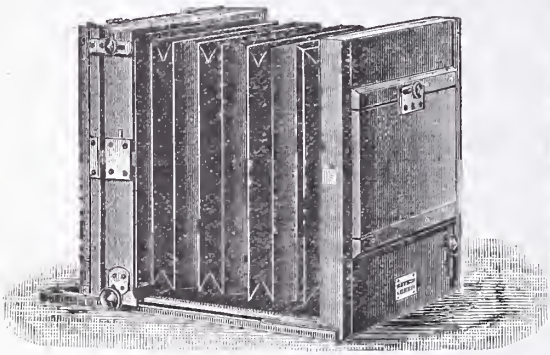
1451.	For Lenses up to ½-plate size, Rectilinear...	£0 15 0
1452.	Ditto, ditto, ¾ and 10 x 8 size, Rectilinear...	1 0 0
1453.	Ditto, ditto, 12 x 10 size, Rectilinear	1 5 0
1454.	Ditto, ditto, 15 x 12 size, Rectilinear	1 10 0

These prices include marking with standard apertures of Photo Society, to match focus of Lens, and are quoted Net for Cash with Order.

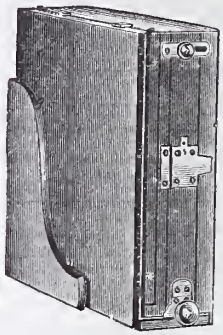
W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

WATSON & SONS'

'POPULAR' CAMERAS



OPEN.



CLOSED.

THESE Cameras, without being made of the same choice material, and with the very high finish of the Premiers, are thoroughly first-rate and efficient instruments, and, being almost entirely made by machinery, we are able to quote them at exceedingly low prices—thus offering better value than could possibly be supplied by anyone manufacturing under less advantageous and economical circumstances. They can be confidently recommended both in point of strength and efficiency.

The Cameras have leather bellows body, folding baseboard, rackwork focussing adjustment, swinging back, 3 double dark slides, and double action front, and are exceedingly light and compact. They are made in two kinds—"A," horizontal, adapted to turn on the side for upright pictures; "B," square, with reversing frame at back.

PRICES.

	A.	B.		A.	B.
¼-Plate	£4 10 0	£5 0 0	½-Plate	£5 15 0	£6 15 0
5 x 4	4 15 0	5 5 0	1 "	7 10 0	8 10 0

PRICE LIST, COMPLETE "B" SETS.

Nos.	1306	1307	1308	1309	1310
Sizes	4¼ x 3¼	5 x 4	6½ x 4¾	7½ x 5	8½ x 6½
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Popular Camera "B," and 3 double slides	5 0 0	5 5 0	6 15 0	7 5 0	8 10 0
Rectilinear Lens, with Waterhouse diaphragms	2 10 0	2 15 0	3 10 0	4 0 0	4 10 0
Black Travelling Case, with lock and key	0 15 0	0 16 0	1 1 0	1 2 6	1 5 0
Folding Tripod Stand.....	0 17 6	0 17 6	1 1 0	1 1 0	1 5 0
Instantaneous Drop Shutter.....	0 12 6	0 12 6	0 12 6	0 12 6	0 15 0
	9 15 0	10 6 0	12 19 6	14 1 0	16 5 0

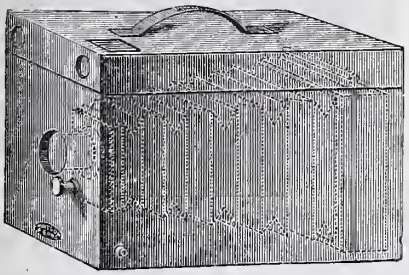
The above Prices are subject to 10 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

WATSON'S

DETECTIVE CAMERA

Original Model. Introduced 1886.



CONSISTS of a leather covered hox, conta n.ng Camera, three Double Dark Slides or Roll-holder, Lens, and Shutter. The Camera is always extended at its mean focus, so requires very little alteration to focus exactly. The focussing is done by a lever heneatb, having a motion of about 1 incb, and so arranged that when it is pushed right forward, any object of 25 yards distance, *or beyond*, will be in sharp focus; while if the lever is pulled rigbt back, an object of 5 yards distance will be sharply focussed. A scale with indicator is provided for intermediate distances. To focus in the usual manner for portraiture, &c., it is only necessary to draw down a shutter at the hack of the case, and tbe ground glass is exposed, and tbe picture can be seen in the ordinary way. No dark cloth is necessary, as the hox itself forms sufficient screen. The lens is rectilinear, very rapid, and specially made for tbese Cameras. The shutter is an adjustable one, admitting of exceedingly rapid exposures, and yet by applying a break the exposure may be prolonged to any time necessary. The exposure, long or short, is made by simply pressing a knoh in the side of the case.

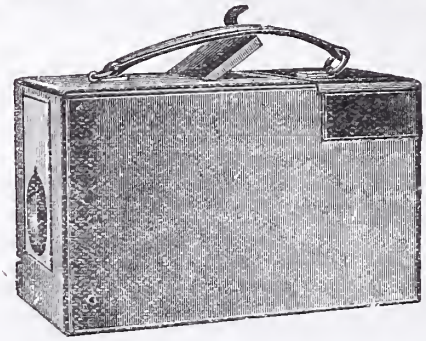
PRICES AND SIZES.	With 3 Douhle Dark Slides.	With Eastman's Roll Holder for 24 cr 48 exposures, and without Dark Slides.
	£ s. d.	£ s. d.
For Plates $4\frac{1}{4}$ x $3\frac{1}{4}$	10 10 0	11 11 0
,, 5 x 4	12 10 0	13 10 0
Sizes.....	$4\frac{1}{4}$ x $3\frac{1}{4}$	5 x 4
Solid Leather Outer Cases	1 10 0	1 15 0
Additional Dark Slides.....	0 15 0	0 17 0

Prices are subject to 10 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

THE

'Vanneck' Hand Camera



MADE in two sizes, the one to hold 12 glass plates 4¼in. x 3¼in., and the other to hold either a magazine containing 12 glass plates 3¼in. x 3¼in., or a roll-holder for films of the same size.

The View Finder is in the middle of the top of the box, and shows the picture as it is being taken on the sensitive plate, less the margin of the plate. The one lens serves for both finder and plate, and is so arranged that when the image is *seen* sharply it is necessarily in focus on the plate. To use this finder, a milled head is fitted under the box, which moves the lens to and fro to focus, and as the operator looks into his finder to see what he is taking, he can by a turn of this screw, immediately set any object seen, near or distant, into perfectly sharp focus.

The shutter will give either instantaneous or timed exposures.

The sensitive plates are contained in a reservoir at the back of the box; this is provided with 12 metal sheaths to hold them, and the changing is done by means of a T nut outside.

PRICE LIST.

4¼in. x 3¼in. Camera, with Special Rapid Rectilinear Lens, and Sheaths to hold 12 Dry Plates	£10 10 0
3¼in. x 3¼in. Camera, with do. do.	9 10 0
3¼in. x 3¼in. ditto. with Roll Holder only	10 0 0
Outer Travelling Case of Solid Leather (with sling) for hard service or use abroad, to fit 4¼in. x 3¼in.	1 2 6
Do. do. do. 3¼in. x 3¼in.	1 0 0
Special Dry Plates, thickly coated and very rapid, either 3¼in. x 3¼in. or 4¼in. x 3¼in., per packet of three dozen ..	0 4 6

Prices are subject to 10 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

SECTION III.

PROGRESS IN PHOTOGRAPHIC CHEMISTRY DURING 1891.

BY C. H. BOTHAMLEY, F.I.C., F.C.S.

ACTINOMETRY AND PHOTOMETRY.

THE photographic activity of light in various parts of the world has been approximately measured by A. Cornish by means of a Stanley's actinometer with the following results, the numbers in A being the times of exposure at mid-day to direct sunlight, and those in B the times of exposure to light reflected from the sky:—(A) London $1\frac{3}{4}$, Bay of Biscay 1, Gibraltar $\frac{7}{8}$, Malta $\frac{7}{8}$, Port Said $\frac{3}{4}$, Aden $\frac{1}{2}$, at sea $\frac{1}{2}$, at sea $\frac{1}{2}$, at sea $\frac{1}{2}$, Albany $\frac{3}{4}$, Melbourne $\frac{3}{4}$. (B) Gibraltar $3\frac{1}{2}$, Malta 3, Port Said $2\frac{1}{2}$, at sea 2, at sea 2, at sea $2\frac{1}{2}$, Albany $2\frac{3}{4}$, Melbourne $2\frac{3}{4}$ (*A. Phot.* xiii., 92).

The quality of light that penetrates sea water may be measured by sinking, during the night, at various depths, tubes containing a mixture of hydrogen and chlorine in equal volumes. The next night the amount of hydrochloric acid that has been formed is measured; its quantity is proportional to the intensity of the light. (P. Regnard, *Compt. Rend. Soc. Biol.* [9] ii., 289).

Absorption of light is measured by Lemoine (*Compt. Rend.* cxii., 936-938) by means of a solution of ferric-chloride and oxalic acid. One cell containing the solution is exposed to the direct action of light, whilst the other is exposed behind the substance the absorptive power of which is to be measured. In both cases the quantity of ferrous salt formed in a given time is estimated. In the case of ferric chloride the result varies with the state of the atmosphore, but the variations are not great under favourable conditions. The results for half normal ferric chloride are represented by the following equation, in which l is the thickness of the absorbing layer, and i is the intensity of the transmitted light:—$i = 0{\cdot}01(0{\cdot}0986)^l + 0\ 07(0.40)^l + 0\ 13(0{\cdot}10)^l + 0{\cdot}79(10^{-10})^l$. See also Lemoine, *ibid.* 992-995 and 1124-1127.

A. Richardson proposes to measure the intensity of light by the expansion that it produces in chlorine gas, and describes an apparatus for the purpose (*Phil. Mag.* [5] xxxii., 277-284).

H. W. Vogel criticises existing photometers (actinometers) (*Phot. Mitt.* xxviii., 73-75). He considers "layer" photometers to be preferable to tube photometers.

H. W. Vogel (*Phot. Mitt.* xxvii., 355-357) shows that a spectrograph with a wedge-shaped slit is not capable of giving accurate measurements of the relative photographic activities of various parts of the spectrum. The chief sources of error are the difficulty of determining the exact point at which the deposit of silver ceases; the fog resulting from the diffused light that enters the broad part of the slit; the misleading effect of an intense Fraunhöfer line.

Lainer (*Phot. Corr.* xviii., 375-376) has verified by direct experiment the law that the time of exposure is inversely proportional to the square of the diameter of the diaphragm. The experiments were made with Steinheil's Antiplanat.

Michalke has continued his actinometric investigations. (*Phot. Mitt.* xxvii., 290-292 and 305-306).

Goderus states (*B. Belge Phot.* (2) viii., 842-847) that when gelatine prints are stripped from polished glass they become strongly electrified, and sparks can readily be seen in the dark.

On determining the sensitiveness of photographic plates by means of the spectrograph. (V. Schumann, *C. N.* lxiii., 33-34.)

Gravier (*B.S.F. Phot* [2] vii., 393-395) uses a sensitometer screen consisting of a number of parallel strips of graduated opacity. A strip about 10 mm. broad is cut off each plate to be examined, and the strips are placed in a frame behind the screen, the strips being at right angles to the bands of the screen. Exposure is made to any convenient light at any convenient distance, and then all the strips are developed. The relative sensitiveness of the various plates is then compared by counting the number of bands visible on each plate.

A. Goderus (*B. Belge Phot.* [2] viii., 525) describes a sensitometer somewhat similar to that of Mucklow and Spurge. Each little cell is 100 mm. high, and has the form of a wedge truncated at the apex. The quantity of light admitted to each cell is determined by the number of holes (all of the same diameter) pierced in a metal plate that forms the cover to all the cells. There are thirty cells, and the number of holes of course ranges from one to thirty. In front of the perforated plate, a piece of thin opal glass is put in order to diffuse the light.

Gouy and Rigollot's actinometer, which consists of two strips of metallic copper, covered with a film of cuprous oxide (by heating in a flame) and immersed in a salt solution, the two plates being connected in circuit with a galvanometer, has been further investigated by Rigollot. (*Ann Chim. Phys.* [6] xxii., 567-574.) When the plates are immersed in a solution (1 : 1000) of sodium chloride, sodium bromide, or sodium iodide, the sensitiveness is greatest in the blue end of the spectrum, the maximum being in the blue-green between wave length 5300 and 4900. The electromotive force is almost proportional to the intensity of the light.

R. Neuhauss employs (*Phot. W.* xvii., 305-308) as a sensitometer a screen of squares of translucent paper, showing 30 different degrees of opacity, and exposes for 15 seconds to a candle 300 mm. distant. His stock pyro-solution contained pyrogallol 7 parts, sodium sulphite 50 parts, water 250 parts, and

his alkali solution sodium carbonate 10 parts, water 100 parts. Development of the exposed plates with a normal developer containing pyro solution 3 parts, soda solution 3 parts, water 3 parts, gave squares Nos. 1 to 6 quite opaque, the opacity then gradually falling to No. 26, the square No. 27 being barely recognisable. A precisely similar plate developed for 1½ hours in a closed vessel with a developer containing pyro-solution 3 parts, soda solution 3 parts, water 150 parts, gave no equal opacity in the more transparent squares, No. 1 being distinct from No. 2, whilst the last square (No. 30) was visible. With an exposure of only two seconds the normal developer showed square No. 16, but the dilute developer after developing for 12 hours, showed square 20. When long development is required pyrogallol is superior to all the other developing agents.

Stolze describes a sensitometer in which the light is admitted to the plate through a long, narrow, wedge-shaped slit in an opaque plate fixed some distance above, and paralliel with, the sensitive film. The relative sensitiveness of different plates is ascertained by comparing each of them with same sensitised paper, all the exposures being made to daylight. (*Phot. Nach.* iii., 162-164 and 225-229).

In order to make sensitometer experiments with daylight, Neuhauss (*Phot W.* xvii., 338) exposes the plates behind the sensitometer screen in a camera, the lens of which is directed towards a large sheet of white paper, which acts as a reflector of the daylight.

Standard candles can be made to give concordant results if proper attention is paid to the shape and size of the wicks and the time of burning. (W. C. Young, *J.S.C.I.*, x, 185-191.)

Optical Photometers for Photographic Purposes, by F. Stolze. (*Phot. Nach.* iii., 257-262.)

EXPOSURE, DEVELOPMENT AND GRADATION.

Hurter has given a popular exposition of some of the results previously obtained in conjunction with Driffield (*Annual* i, 70). He points out that the energy required for the reduction of silver bromides, is much greater than can possibly be derived from ordinary sources of illumination. By illuminating a plate from both sides it was found possible to make all the silver bromide on it reducible by the ferrous-oxalate developer. A well-washed plate was exposed and again washed, but no trace of bromide could be found in the wash water, hence Hurter concludes that no hydrobromic acid had been formed, and consequently that no substitution of bromine in the gelatine had taken place. The plate was then developed with weak pyrogallol solution quite free from any trace of chlorides, bromides, or iodides, 194·4 mgms. of reduced silver were found in the film, and bromine equivalent to 197·7 mgms. of silver was found in the developer. Hurter considers that this proves that no bromine is lost, and no combination of bromine with gelatine takes place during the exposure. (*Phot.* iii., 120-122 and 135-137.)

Chapman Jones (*Phot.* iii., 161-162) considers that Hurter and Driffield have not established their propositions, and states that his own experiments contradict them.

Sutcliffe states that Hurter and Driffield's results are in contradiction to his own experience (*Phot.* iii., 162-164).

Abney offers (*J.S.C I.* x., 18-20) further criticism of Hurter & Driffield's method of experiment, and gives the results of a number of measurements made by his new method (*Annual* i., 71), using in some cases a movable lamp, in others a sector photometer. He shows that the measurements by both methods agree, the opacities being considerably lower than those obtained by Hurter & Driffield. Experiments are described which show that the opacities thus measured coincide with the printing effects of the negatives.

Hurter & Driffield contend (*ibid.* 20-24) that the sector photometer is incorrect, and that Abney's "law of error" is erroneous. They describe experiments made with a view to prove that their method of measurement is accurate, and they consider that an experiment by Chapman Jones on the effect of different methods of development really confirms their statements, and is not antagonistic to them.

Hurter & Driffield subsequently contend (*ibid.* 98-99) that Abney's latest method of measuring opacities is inaccurate because he has not taken into account the difference between the reflective powers of paper and a negative.

Chapman Jones (*ibid.* 99-100) repeats his contention that he can by different methods of development alter the density ratios, and Hurter and Driffield repeat their denial of the possibility of doing it. In another paper (*ibid.* 100-104) Hurter & Driffield discuss the ratios between negatives, positives, and reprodnced negatives, and describe a method for obtaining a "perfect" positive.

In a still later paper (*ibid.* 318), Hurter states that Abney has satisfied him as to the accuracy of the sector photometer when used under the conditions that Abney lays down. Also that Abney is now satisfied as to the accuracy of the Hurter & Driffield instrument, whilst still doubting whether it gives the true optical density.

See also Neuhauss under Actinometry.

SPECTROSCOPY.

The spectrum of ammonia burning in oxygen has been photographed by Eder (*Phot. Nach.* iii., 220-222.) In the ultra violet between λ 2718 and λ 2262 several new bands were observed.

Report on progress in spectrum work. (H. Rowland, *Phot. N.* xxxv., 269-270.)

Absorption spectrum and colour of liquid oxygen. (K. Olzewski *(ib.)* 663-665.)

Miscellaneous Papers.—An application of photography (C. V. Boys, *Cam. C.J.* v., 94-96). An account of a method of photographing falling drops of water.

On pin-hole photography. (Lord Rayleigh, *Phil. Mag.* [5] xxxi., 87-99.)

Meteorological photography. (*Phot. Mitt.* xxviii., 75-80.)

Use of fluor spar in optical instruments. (S. P. Thompson, *Phil. Mag.* [5] xxxi., 120-123.)

Photography and crime, by P. Jeserich (*Phot. W.* xvii., 9-11, 20-22).

ILLUMINATION, SCREENS, ETC.

Aluminium may be used in place of magnesium for flash-light purposes, but somewhat larger quantities of metal are necessary. The light is white and there is very little smoke. (*Phot. Corr.* xviii., 186-187.)

Aluminium foil is easily ignited and gives no smoke. Coarse aluminium powder yields unsatisfactory resnlts; fine aluminium powder, with potassium chlorate and antimony sulphide gives good results, but prodnces smoke. If, however, the snlphide is left out and the aluminium powder mixed with potassium chlorate alone, there is no smoke. Alumininm cannot be burnt in a flash lamp in consequence of its high ignition point. (Putz, *Phot. Corr.* xviii., 290).

Magnesium Flash Powders.—Eder and Valenta (*Phot. Corr.* xviii., 511-516) have made experiments with a view to find some substitute for the explosive powders containing potassium chlorate. They compared the rate of combustion and photographic efficiency of Müller's mixture (magnesium 4 parts, potassium perchlorate 3 parts, and potassium chlorate 3 parts) with the well-known mixtures of magnesium with potassium nitrate or potassium permanganate, and also with mixtures of magnesium with ammonia and potassium dichromates. A mixture of one part magnesium and 3 parts potassium permanganate (the quantity containing the exact proportion of oxygen required for complete combustion of the magnesinm) althongh it burns very rapidly, has comparatively little activity, and three times the photographic effect is obtained with only one part of permanganate, although in this case the mixture burns more slowly.

	Time of Combustion in seconds.	Relative Photographic activity.
1 gramme (15½ grains) of magnesium mixed with ¾ gramme potassium chlorate and ¾ gramme potassium perchlorate	1/11	48
3 grammes potassium permanganate ..	1/14	16
1 ,, ,, ,, ..	1/7	48
1 ,, ammonium dichromate ..	¾	40
1 ,, potassium dichromate ..	¼	36
1 ,, potassium nitrate	1/6	48

The rate of combustion is higher, the more finely the substances are powdered, and the more intimately they are mixed. Figures are given showing the photographic activity of magnesium as compared with other sources of light. Mixtures of magnesium and potassium nitrate or potassium permanganate (which are not explosive) may effectively replace the explosive chlorate mixture, but where a very brief exposure is required in conjunction with high photographic activity, the latter must be used.

Kunisch states that the mixture of potassium perchlorate 60 parts, and powdered magnesium 40 parts, recommended by M. Muller and by Röhmann and Galewsky, is not affected by percussion, friction, or prolonged heating at 45° C (113° F). This is true also of the mixture of potassium chlorate 2 parts, milk sugar 1 part, recommended by Röhmann and Galewsky for the purpose of igniting the magnesium mixture. It is easily ignited by means of a match. *Phot. Mitt.* xxvii., 273.)

E. J. Humphrey (*Cam. C.J.* v., 209-211) states (on Abney's authority) that magnesium burnt in oxygen has twelve times the actinic value of the same weight of magnesium burnt in air. He burns magnesium in a flask filled with oxygen, and uses the light thus obtained for portraiture, etc. Three grains of magnesium is sufficient at a distance of 15 feet from the sitter. During combustion the flask should be allowed to swing in order to soften the shadows. Platinum prints can be obtained in about a minute by the combustion of about 30 grains of magnesium.

Redwood blows magnesium powder into a flame that is allowed to impinge upon a screen of sheet metal or wire gauze, which spreads it out over a considerable area. In this way combustion is made more perfect than when the flame has the ordinary shape. (*Eng. Pat.*, 401, Jan. 9th, 1890.)

Acworth has made some photo-spectrographs of the magnesium flash light on ordinary plates and plates sensitised with erythrosin and erythrosin silver. He states that Schirm uses erythrosin silver plates (sometimes with a yellow screen) for flash-light portraiture. (*Cam. C.J.* v., 123-127).

Incandescent Gas Lighting on the Welsbach system with different mixtures of oxides of the rarer earth metals has been discussed by W. Mackean (*J.S.C.I.* x., 196-199).

New electric lamp. (*Phot. N.* xxxv., 315-316).

Screens.—In order to increase the adherence of films of coloured gelatine to glass (*Annual* i., 74) it is advisable to first coat the carefully cleaned glass with gelatine 1 part, water 250 parts, chrome alum solution (1 : 50) 6 parts, dry, and then coat with dyed gelatine. Another method is to coat the glass with plain collodion (3½ per cent.), then with dyed gelatine, and again with collodion. (E. Vogel, *Phot. Mitt.* xxvii., 338-339.)

CHEMISTRY.

Action of Chlorine and Bromine on Metals.—Chlorine and bromine when dry act very slowly on metals. Magnesium shows the least action of those experimented with (magnesium, aluminium, zinc, iron, copper, and silver), whilst aluminium differs from the others, and is readily attacked. In presence of water the results are very different. (H. Gautier and G. Charpy, *Compt. Rend.*, cxiii., 597-600.)

Chlorophyll.—W. N. Hartley has examined the spectra of blue and yellow chlorophyll, and describes methods of extracting them from leaves, and separating them from one another. (*C.S. Trans.* lix., 106-124.)

Asphalt or Bitumen.—Crude Syrian asphalt and the sulphuretted asphalt are not made insoluble by the action of light in a vacuum or in an atmosphere of hydrogen. It follows that the insolubility is a consequence of oxidation under the influence of light. If ozonised air is led into the solution the sensitiveness to light is increased, but some of the asphalt becomes insoluble in turpentine. Iodine has a similar effect, but quinone is without action. Guaiacum is a useful addition since it facilitates the development of a clear image. (Valenta, *Phot. Corr.* xviii., 362-375.)

Guaiaretic Acid, $C_{20}H_{26}O_4$ (obtained by the action of caustic potash on a concentrated alcoholic solution of guaiacum) when freshly prepared, is soluble in alcohol, ether, acetic acid, chloroform, benzene, and carbon bisulphide ; but if the free acid, or its metallic or organic salts, or their haloid substitution derivatives are exposed to light, they become more or less insoluble in the solvents specified. Addition of small quantities of colouring matters, such as aniline, violet, magenta or safranine to the guaiaretic acid, or guaiaretates, accelerates the action of light. A benzene solution of the acid or its salts, mixed with a small quantity of caoutchouc, may be spread on a cleaned surface, and after exposure the image is developed with a mixture of benzene and turpentine, or some other similar fluid. The acid or its salts may also be mixed with gelatine, developed with benzene after exposure, and the gelatine then hardened, and the image used for etching. (J. North, *Eng. Pat.*, 8,557, May 19th, 1891.)

Organic Compounds.—Bromine in sunlight acts upon parethyltoluene, ethyl-benzene, and butyl-benzene yielding mono or di-substitution derivatives according to the proportion of bromine. (J. Schramm, *Ber.*, xxiv., 1332-1337.)

When finely powdered quinone (5 parts by weight) and benzaldehyde (10 parts by measure) are exposed to sunlight, dibenzoyl quinhydrone is formed. Quinone and isovaleraldehyde when exposed to light yield isovalero-quinhydrone. In the dark these changes take place to a very trifling extent only. (H. Klinger and O. Standke, *Ber.*, xxiv., 1340-1346.)

Anethoïl when exposed to light in the form of crystals soon liquefies. On fractionation and crystallisation the product is found to contain a small quantity of a new polymeride of anethoïl, *photoanethoïl*. (G. de Varda, *Gazetta Chim.* xxi., 183-188.)

Silver Compounds.—Carey Lea has continued his researches on allotropic silver, and finds that, broadly speaking, three forms can be obtained. (1) An unstable gold-coloured variety, easily turned into ordinary white silver by the action of light and various reagents; (2) a stable gold-coloured variety obtained by the action of light or heat on the unstable gold-coloured form, or on some modifications of blue silver, and also by the action of acids on blue silver ; (3) blue silver, insoluble or soluble, and more or less sensitive to light, according to the method of preparation. The solution of blue silver when diluted has a deep ruby red colour, and is perfectly transparent; it is easily precipitated by acids and salts. Precipitated blue silver, even after prolonged washing, contains only from 93 to 96·6 per cent. of the metal. Probably in allotropic silver the metal exists in an atomic condition, and probably it is in a similar condition in the sub-salts of silver. (*Amer. J. Sc.* [3] xli., 179-190, 259-267, 482-489, xlii., 312-317. *Phil. Mag.* [5] xxxi., 238-250, 320-329, 497-504, xxxii., 337-343.)

A. J. A. Prange confirms most of Carey Lea's statements. The red solution of blue silver is perfectly transparent, and contains no suspended matter. The metal is precipitated by exposure to light, addition of acids, alkalis, or salts, or by agitation with powdered graphite, chalk, etc. If the metal is precipitated by ammonium nitrate it is quite insoluble in water, but dissolves readily in dilute inorganic acids and in acetic acid. It contains no

oxygen, but always contains traces of iron. Its conversion into ordinary silver is accompanied by a considerable development of heat. (*Rec. Trav. Chim.* ix., 121-133.)

Elder has failed to obtain soluble blue silver by Carey Lea's method, and he criticises Lea's views as to the nature of so-called allotropic silver. (*Cam. C.J.* v., 97-98.)

Meldola considers that it is by no means proved that Carey Lea's products are really allotropic modifications of silver. It seems more probable that they are normal silver, the properties of which are modified by the presence of impurities in the same way that the properties of gold are greatly altered by the presence of very small quantities of other metals. (*J.S.A.*, 1891.)

Solutions of colloidal silver are non-conductors of electricity, and from this fact and other considerations C. Barus and E. A. Schneider conclude that the so-called solutions contain in suspension very minute particles of normal silver, and do not contain atomic silver in true solution. The absence of any polarising action on light is probaby due to the very minute subdivision of the particles. (*Zeit. P.C.* viii., 278-298.)

Colloidal silver prepared by Carey Lea's method cannot be purified by dialysis alone; filtration, re-solution, and dialysis is necessary. No hydrogen is evolved when hydrochloric acid acts in sufficient quantity to produce a considerable precipitate of silver chloride, and hence the presence of silver oxide seems probable. (E. A. Schneider, *Ber.* xxiv., 3370-3373.)

Photo-chlorides.—F. Probst has repeated Carey Lea's experiments, and in general confirms his results. Stannous chloride mixed with caustic soda until a slight permanent precipitate is produced, and poured into ammoniacal silver nitrate, yields a grey precipitate, and if the latter is treated with hydrochloric acid, and afterwards with nitric acid, a brilliant red photo-chloride is obtained. If silver oxalate is exposed to light in presence of water until it becomes dark brown, and is then treated with hydrochloric acid and the product purified with nitric acid, a photo-chloride is obtained identical in properties with the photo-chloride produced by chemical reduction. (*Phot. Corr.* xviii., 161-163.)

Blue-sensitive Silver Bromide in collodion shows maximum sensitiveness at the same point in the spectrum as blue-sensitive silver bromide in gelatine, and is distinctly different in spectrographic behaviour from the violet-sensitive silver bromide in collodion. Blue-sensitive silver bromide in collodion, however, has only about one-third of the sensitiveness that it possesses when in gelatine. (E. Vogel, *Phot Mitt.* xxviii., 139-140.)

Acworth (*Cam. C.J.* v., 205-208) has made experiments on the effect of previous heating on the sensitiveness of the silver haloids to light. No general conclusions are drawn, but, as a rule, whilst heating to a moderate temperature, such as 50° C. or 100° C., increases the sensitiveness, heating at a higher temperature, such as 160°-200° C., seems to make the salts practically insensitive. Gelatino-chloride emulsion becomes insensitive to light and developer when heated at 200°, and is practically not sensitive after heating at 150°.

Pure Films of Silver Bromide on glass are remarkably insensitive to light. An exposure to bright sunlight, sufficient to solarise the

slowest gelatino-bromide plate, showed no difference between the exposed and unexposed parts in reducibility by ferrous oxalate or alkaline pyrogallol. If, however, a strip of the film is brushed over with a weak solution of gelatine and then exposed for a few seconds, washed in warm water and treated with the developer, the film under the gelatine is readily reduced, whilst the rest is unaltered. Films of silver iodide on glass are also not changed in reducibility by exposure to light, though the exposed part undergoes some physical change and becomes more opaque. If, however, the film is treated with an acid developer, silver is deposited on the exposed part of the film much more rapidly than on the unexposed part. (Meldola, *J.S.A.*, 1891.)

Modifications of Silver Bromide.—Melted silver bromide has a very dense absorption band near D, and if heated still more strongly it absorbs almost all the rays of the visible spectrum. In presence of silver iodide all the absorption maxima are displaced towards the red. Schumann is unable to confirm Vogel's statement that there exist two modifications of silver bromide, one precipitated by alcohol and incapable of emulsification in gelatine, the other precipitated from watery solutions and incapable of emulsification in collodion. The phenomena observed by Vogel probably resulted from drying the silver bromide at too high a temperature, since this treatment makes the silver bromide incapable of suspension. No spectral differences could be recognised when the two precipitates were separately suspended in gelatine. (V. Schumann, *C.N.* lxiii., 97.)

Silver bromide on paper becomes sensitive to the action of a developer when heated at 100°, or better 140°, in the dark. Since the paper is not quite dry this may be regarded as a simultaneous effect of heat and moisture. Silver chloride darkens in absence of light when heated in water at 100° for three to four hours ; silver-bromide under similar conditions becomes greenish-yellow and finally grey. (Carey Lea, *Amer. J. Sc.* [3], xli., 259-267.)

Silver Subchloride.—When dry hydrogen chloride is passed over silver subfluoride, silver subchloride Ag_2Cl is obtained as a violet solid. Carbon tetrachloride, silicon tetrachloride, phosphorus chloride, and other volatile chlorides behave in the same way as hydrogen chloride. Silver subiodide and silver subsulphide can be obtained from the subfluoride by the action of hydrogen iodide and hydrogen sulphide respectively ; silver suboxide is formed by the action of water vapour at 160°. (Guntz, *Compt. Rend.* cxii., 861-862.)

Silver subchloride varies in colour from deep violet-red to violet-black, the action of light always tending to form the latter variety. When heated it splits up into ordinary silver chloride and metallic silver. Potassium cyanide and sodium thiosulphate produce a similar decomposition, the silver chloride dissolving, and the metallic silver remaining undissolved. Silver subchloride is not affected by dilute nitric acid, but when warmed with the concentrated acid it yields products identical with Carey Lea's photo chloride (Guntz, *ibid.* 1212-1213).

Action of Light on Silver Chloride.—When silver chloride is spread in thin layers on glass and exposed to light, it at first darkens very little, but if placed in an ordinary photographic developer it is reduced to metallic silver. The increased ease of reduction seems to be due to the con-

version of the silver chloride into some isomeric modification under the influence of light. If silver chloride is boiled with water in the dark for several hours it becomes reducible by ferrous oxalate, and hence it would seem that under these conditions a change is produced similar to that resulting from the action of light. When exposed to light in a vacuum, silver chloride becomes violet red; when exposed in presence of air chlorine is liberated, and there is loss of weight. The first product is silver sub-chloride, which is formed only in small quantities at the surface of the silver chloride, and the final product of the prolonged action of light is metallic silver. (Guntz, *Mon. Phot.* xxx., 114-115.)

When silver chloride is exposed to light in presence of water, oxygen is given off. If the proportion of water is small it contains hydrochloric acid and free chlorine (or oxides of chlorine), but the amount of the latter decreases as the proportion of water increases, and with a large quantity of water all the liberated chlorine is in solution in the form of hydrochloric acid. Previous addition of hydrochloric acid increases the *proportion* of free chlorine, but reduces the total quantity of chlorine liberated, or, in other words, retards decomposition. It is stated that part of the oxygen is liberated in the form of ozone, but that no hydrogen peroxide is formed. Silver chloride was exposed to light under water until it lost eight per cent. of its chlorine, but no oxygen could be detected in the darkened product. (A. Richardson, *C. S. Trans.* lix., 536-544.)

Thin films of precipitated silver chloride on glass, when exposed to light in presence of air, lose 8·57 per cent. of chlorine, and when the product is treated with nitric acid silver is dissolved in quantity equivalent to the amount of chlorine liberated. Hence it would seem that the action of light merely separates the chlorine from the silver Thin films exposed until they were thoroughly darkened contained 22.5 per cent. of silver soluble in nitric acid. (Hitchcock, *Amer. C. J.* xiii., 273-277)

Action of Electric Sparks on Gelatino-bromide Plates.—When plates that have been exposed to daylight are subjected to the action of sparks from a Wimshurst machine and again exposed to light, black lines and markings appear in the path of the sparks. The lines do not appear if the plate is kept in the dark after the action of the spark, nor if the plate has not been exposed to daylight before the action of the spark. (W. P. Adams, *B. J. Phot.* xxxviii., 617)

Reduction of Silver Salts.—Schumann states (*Phot. Corr.* xviii., 101-102) that when hydrogen is passed over glass wool moistened with silver nitrate, lustrous metallic silver separates and nitric oxide is liberated. Silver sulphate is also reduced under the same conditions, but the metal separates in a matt grey form.

Turpentine.—When exposed to light in presence of air and moisture turpentine is partially converted, as Sobrero observed many years ago, into a white crystalline compound. This substance has been investigated by Armstrong and Pope (*C. S. Trans.* lix , 315-320), who give it the name *sobrerol.*

Cross suggests (*Phot. N.* xxxv., 730-732) that silver salts in emulsions, diazo-primuline in fibres, &c., are in a state of *solid solution*, and therefore, adopting the latest theory of solution, are in a partially dissociated or unstable condition.

WEIGHTS, MEASURES AND FORMULÆ.

American Weights and Measures.—The ordinary United States pharmacopœial ounce is the troy ounce of 480 grains; the fluid ounce is 455·7 grains at 60°F., being one-sixteenth of the pint, which weighs 7291·1 grains, and is itself one-eighth of the old wine gallon of a capacity of 231 cubic inches, and weighing (in water) 58 328 9 grains at 60°F. The United States minim is $\frac{1}{480}$ of the fluid ounce of 455·7 grains, and is therefore 0·949 grain. The U.S. grain is identical with the English grain. (N. B. Sizer, *Phot. T.* xxi., 403-404.)

PHOTOGRAPHIC MATERIALS, Etc.

Acids and Alkalis.—Bothamley (*Phot.* iii., 834-835) points out the importance of distinguishing between substances that contain free acid and those that merely have an acid reaction, and substances that contain free alkali and those that have an alkaline reaction. He gives a table showing the acidity, alkalinity or neutrality of the chemicals commonly used in photography to the three indicators, litmus, methyl-orange, and phenolphthalein.

Asphalt or Bitumen.—Valenta (*Phot. Corr.* xviii., 362-375) has made experiments with a view to devise a method of increasing the sensitiveness of asphalt to light without the necessity for a troublesome and expensive process like purification with chloroform or ether. Kayser showed some time ago that the three proximate constituents into which asphalt can be separated by the action of various solvents all contain sulphur, and the sensitiveness to light is greater the higher the proportion of sulphur. Valenta himself found that ordinary colophony can be made slightly sensitive to light by melting it with sulphur, and from this starting point he has worked out the following method:—Ten parts of flower of sulphur is dissolved in carbon bisulphide, and 100 parts of powdered asphalt is added to the solution. After some time the whole of the asphalt is dissolved, and the carbon bisulphide is then distilled off and the residue gradually heated until evolution of sulphuretted hydrogen begins (about 180°). It is maintained at this temperature for several hours, care being taken that the substance is not made too hot, since in the latter case insoluble carbonaceous products are formed. The product is a black lustrous mass insoluble in alcohol, and only slightly soluble in ether, but completely soluble in turpentine, benzene, chloroform or carbon bisulphide. It has a relatively high sensitiveness to the action of light, being about 1½ times as sensitive as "Husnik's asphalt," and asphalt purified with ether or chloroform. All kinds of turpentine are not equally suitable for the development of the image. French, Austrian, and rectified American turpentine were used with good results Rectified turpentine should always be used since the crude oil contains resin acids, formic acid, etc.

Asphalt is found in California, Utah, Colorado, and Wyoming, but the only useful sources are the first two The most important Californian deposits are in the Ventura district, and the purity of the product compares

favourably with that from Val de Travers and Trinidad. (*J.S.C.I.* x, 40, from *Eng. Min. J.*)

Benzene.—Lainer (*Phot. Corr.* xviii., 70-72) calls attention to the fact, well known to chemists, that coal-tar benzene can be distinguished from petroleum benzene by shaking with a crystal of iodine; the former yields a carmine-red solution, and the latter a violet solution. Alcohol or ether vitiates the test.

Exsiccators and Drying Agents.—Hempel (*Ber.* xxiii., 3566-3568) points out that when using a drying agent such as calcium chloride, it is the common practice to place it at the bottom of the space to be dried. This is an error, for since air containing aqueous vapour is lighter than dry air, the material intended to absorb the aqueous vapour should be placed at the top of the space.

Gold is removed both from solution and suspension by the fungoid growths that form in solutions of potassium acetate, potassium tartrate, citric acid, magnesium sulphate, etc. The growths do not form in presence of chloroform, benzene, carbon bisulphide, or turpentine. (A. Liversedge, *C.N.* lxii., 277-279.)

Guaiacol, when heated with chloroform and solid caustic potash, gives a purple-red colouration, the distinctness of the reaction increasing with the purity of the material. When mixed with concentrated sulphuric acid, pure guaiacol gives a permanent purple red colouration, but any impurity interferes with the reaction. (P. Marfori, *Gazetta Chim.* xx., 537.)

Ink for White Titles on Albumen Prints.—Write on a dark part of the print, or on an edge of the paper purposely printed very dark, with potassium iodide 20 parts, distilled water 60 parts, iodine 2 parts, gum arabic 2 parts. (*Phot. T.* xxi., 261.)

Iodine dissolved in chloroform or carbon bisulphide (violet solutions) differs from iodine dissolved in alcohol, ether, or acetone (brown solutions), in its mode of action on metals. Apparently the iodine in the violet solutions is in a simpler molecular condition than in the brown solutions. (H. Gautier and G. Charpy. *Compt. Rend.* cxi, 645-647.)

Mucilages that will Keep.—(1.) Water, 1,000 parts; gelatine, 25 parts; arrowroot, 125 parts; alcohol, 60 parts; carbolic acid, small quantity.

(2.) Soak gum arabic in 1½ parts of water for a few days; dissolve on the water bath, filter through cloth, and to every 250 parts add 1 part of carbolic acid.

(3.) Pour 40 parts of starch suspended in a small quantity of cold water into 500 parts of boiling water, with vigorous stirring. Boil for about three minutes, add 20 parts of a 10 per cent. alcoholic solution of thymol. Allow to cool, and filter through gauze. (*W. Phot. M.* xxviii., 28, from *Boll. Am. Fot. Roma*.)

Paste for lantern slide binders, etc., may be made as follows:—Flour, 1 oz.; alum, 60 grains; powdered camphor, 30 grains; water, 5 ozs. Mix thoroughly, and boil until it thickens. It keeps well, but its stability is improved by addition of 1 grain of mercuric chloride (corrosive sublimate). (*Phot. N.* xxxv., 163.)

Paper for packing plates is tested by placing a piece on one half of the film of a silver eosin plate, putting a clean glass plate on the top, fastening the two together, and allowing them to remain in the dark for one to three weeks. The plate is then treated with a well-restrained developer, and the quality of the packing paper is shown by the amount of fog on that part of the film with which it has been in contact. (H. W. Vogel and E. Vogel, *Phot. Mitt.* xxviii., 23.)

Quinol (hydroquinone) when heated at 100° with twice its weight of sulphuric acid of 66° is converted into quinol monosulphonic acid, $C_6H_3(OH)_2SO_3H$, which crystallises in acicular crystals soluble in alcohol. Its barium salt and potassium salt are soluble in water and form acicular crystals. When mixed with sodium carbonate, they slowly develop an image on an exposed gelatino-bromide plate, the colour of the deposit being reddish brown. (J. H. Stebbins, jun., *J. Amer. C. Soc.* xiii., 155-159.)

Residues.—Rivaud recovers silver and gold from old baths by passing into them an electric current, the positive electrode being a plate of carbon, and the negative electrode a plate of zinc. The metals are deposited on the zinc. (*W. Phot. M.* xxviii., 716-717, from *Prog. Phot.*)

Silver Estimation.—Rapid estimation of the quantity of silver in silver baths is made in the following way (Mercier, *B.S.F. Phot.* [2] vii., 64-66):—68·82 grammes of pure and dry common salt and a few grammes of potassium dichromate are dissolved in 1,000 c c. of distilled water. A cylindrical dropping tube with a diameter of 3 mm. is used for measuring the silver bath and the salt solution, its accuracy being carefully verified; 20 drops of water from the tube should weigh 1 gramme. 20 drops of the silver bath are measured off and neutralised if necessary. The salt solution is then added drop by drop, with careful agitation after each addition, until the red precipitate becomes suddenly white. The number of drops of the salt solution required to effect this gives the quantity of silver nitrate in 100 grammes of the bath analysed.

Mercier's process is more accurate if the silver solution is diluted so that the precipitate separates in a finely divided form. It is sufficiently accurate if 69 parts or even 70 parts of sodium chloride are weighed out instead of 68·82 parts, but the salt should be carefully dried before weighing. (Stolze, *Phot. Nach.* iii., 383.)

Silver Fluoride.—Well washed silver carbonate is dissolved in hydrofluoric acid and the solution evaporated to dryness in a platinum basin with constant stirring. The black pulverulent product is dissolved in water and filtered, and the filtrate evaporated over sulphuric acid in a vacuum in the dark. Silver fluoride is thus obtained as a tough, elastic, transparent yellow mass, soluble in water. (H. Moissan, *Bull. Soc. Chim.* [3] v., 456-458.)

Solvent for Cellulose (C. F. Cross and E. J. Bevan, C. N. lxiii., 66). —When zinc-chloride is dissolved in twice its weight of hydrochloric acid, a solution is obtained (sp-gr 1·44) which rapidly dissolves all forms of pure cellulose without sensible modification. Raw fibres such as cotton or flax, are only partially dissolved but swell up under the influence of the re-agent. Jute and ligno-celluloses are dissolved by the re-agent, and many of the adipo-celluloses also.

Sulpho-cyanides.—J. Hendrick found in a sample of potassium sulpho-cyanide only 31 per. cent of sulpho-cyanide, almost the whole of the remaining 69 per cent. being potassium chloride. Three other samples of potassium sulpho-cyanide were, however, found to be practically pure. (C. N. xliii., 130.)

Thiocarbamide combines readily with ammonium bromide and other haloid salts, forming definite crystallisable compounds. The compound, with ammonium bromide, *tetrathiocarbamidammonium bromide*, contains four molecules of thiocarbamide and one molecule of ammonium bromide. It is easily prepared by dissolving 10 parts of ammonium bromide in the smallest possible quantity of hot alcohol, and then adding a boiling and nearly saturated alcoholic solution of 30·4 parts of thiocarbamide. Boil for five minutes and allow to cool. The crystals that separate are drained, pressed, and recrystallised from alcohol. No similar compounds are formed by the substituted thiocarbamides such as thiosinnamine or phenyl thiocarbamide. (J. E. Reynolds, *C.S. Trans.* lix., 383-395.)

Turpentine.—French turpentine is remarkably constant in composition and properties, whilst American turpentine shows considerable variations, especially in optical properties. A turpentine from British Burmah, derived from *Pinus Khasyana*, is the counterpart of French turpentine, but its optical properties are opposite in sign. (Armstrong, *C.S. Trans.* lix., 311-315.)

Varnishes.—Benzene* matt varnish is obtained most simply by adding a certain quantity of benzene to an ethereal solution of sandarac. A solution of 1 part of sandarac in 10 parts of ether answers very well; weaker solutions give a thin fine-grained layer, not sufficiently resisting to the retouching pencil or brush; stronger solutions (*e.g.*, 1 in 6) give denser layers, but are difficult to manipulate. The addition of 35 parts of benzene to 100 parts of ethereal sandarac solution yields a useless transparent, brittle film; 40 parts of benzene gives a slightly matt, but still useless, film; 45 to 50 parts of benzene give a perfectly matt film, but the result varies with the purity of the benzene. With larger proportions of benzene the film becomes coarse-grained, and with 65 parts the grains are opaque and flocculent. Even with 65 parts of benzene good films are obtained if 2 to 4 parts of alcohol is added, the transparency of the film increasing with the proportion of alcohol. With 6 parts of alcohol the film is uneven, and with eight parts it becomes transparent. Dilution with ether up to 20 or 40 parts increases the transparency of the films, and at the same time reduces their resisting power.

Ethereal solutions of dammar or mastic, when mixed with benzene or toluene, do not yield matt films, but they may be added with advantage to the benzene-sandarac varnish. Too much dammar or mastic makes the film soft and even adhesive. A good sandarac-dammar matt varnish is obtained as follows:—Ethereal sandarac solution (1 in 10) 50 parts, ethereal dammar solution (1 in 10) 50 parts, benzene 60 parts, alcohol 2½ to 3 parts. The exact proportion of alcohol must be determined by trial. A higher proportion of dammar than that given yields flocculent greasy films that are not completely matt.

* That is, coal tar benzene, sp. gr. 0·85 and boiling point 80°; *not light* petroleum, which is sometimes called petroleum-benzene.

A very fine grain is obtained with a sandarac-mastic varnish:—Ethereal sandarac solution (1 in 10) 90 parts, ethereal mastic solution (1 to 8) 10 parts, benzene 50 parts, ether 20 parts. A higher proportion of mastic gives an opalescent uneven film.

The bottles containing the varnish must be kept tightly closed in order to prevent evaporation of the ether. The film may be washed with water, and may, therefore, be painted with water-colours. It is attacked by benzene or chloroform, less readily by carbon bisulphide, and not at all by light petroleum. It is not injured by warming, but becomes harder and takes a lead pencil more easily. If the film is to be covered with indiarubber, a solution of the latter in light petroleum, and not in benzene, must be used. (Lainer, *Phot. Corr.* xviii., 273-276.)

Matt varnish can be prepared more cheaply with toluene than with benzene, the latter being more expensive and a larger quantity being necessary in order to produce precipitation of the resin. The following proportions give good results: Ether, 100 parts; sandarac, 10 parts; toluene, 35 to 40 parts. The finely powdered sandarac is agitated with the ether until it all dissolves, and the toluene is added to the filtered solution. If 120 cc. of ether is used instead of 100 cc. the varnish, when dry, is less opaque, and the film is more granular. With more than 40 parts of toluene the gum resin separates in a flocculent form If this should happen, the addition of more of the ethereal solution is necessary. When using the varnish it is important that the whole surface of the plate should be covered with it before any is allowed to drain off. (Lainer, *Phot. Corr.* xviii., 121-123, 175.)

Matt varnish made with benzene or toluene may be coloured yellow by means of aurantia, 1 gramme (1 part) of the finely powdered dye being shaken with 200 cc. (200 parts) of the varnish until no more is dissolved, the clear liquid being poured off after the undissolved substance has been allowed to settle. The intensity of the colour may be reduced by adding some of the matt varnish containing no aurantia. The film takes the pencil, etc., readily, and hence is of great service in strengthening and improving negatives, but the dye is affected by light, and the colour gradually fades. Neither eosin nor magenta gives satisfactory results. A brown colour, not liable to fade, is obtained by dissolving asphalt in the varnish. (Lainer, *Phot. Corr.* xviii., 225-226.)

Black varnish.—Mix essence of turpentine, 100 parts; bitumen of Judea, 10 parts; wax (grated), 4 parts; lamp-black, 2 parts. Allow to stand for two hours, and melt on a water bath. (*W. Phot. M.* xxviii., 301.)

Retouching Varnish.—Turpentine, 30 parts; Venice turpentine, 30 to 60 parts; resin, 2 parts; lead acetate, 1½ parts. Mix on a water bath, and add 1 part camphor. (J Wilcox, *Phot. W.* xvii., 70.)

Blocking Out Skies, improving negatives, &c., is conveniently done by means of a solution of 375 grains of gelatine, 150 grains of aniline red, 75 minims of prepared ox gall, and 10 drops of creosote in 20oz. of water. The substance does not dry rapidly, hence the edges can be softened off, and other modifications made. (H. H. Beale, Eng. Pat 16,238, Oct. 13, 1890.)

Aluminium and aluminium bronze. (C. Sauer *Phot. Mitt.* xxviii., 126-128.)

Aluminium and its application in photography. G. Addenbrooke (*Cam. C. J.*, v., 211-214.)

Gum arabic and its modern substitutes. (S. Rideal and W. E. Youle, *J.S.C.I.*, x., 610, 622.)

Lacquers. Several formulæ are given by H. C. Standage. (*Phot. N.* xxxv., 874-876.)

Luminous paints. (For several recipes see *Phot. N.* xxxv., 686.)

Pine resin in beeswax (*J.S.C.I.*, x., 575-576, from *Chem. Zeit.* xv.

Quantitative determination of mechanical wood pulp in paper. R. Benedikt and M. Bamberger (*J.S.C.I.*, x., 576-577, from *Chem. Zeit.* xv.; and *J.S.C.I.* x., 661.)

Preparation of gold and silver powders for photo-ceramics. (P. C. Duchochois, *Phot. T.* xxi., 14 15.)

Varnishes, various formulæ on. (*A. Phot.* xiii., 439-440.)

Manufacture of photographic varnishes. (H. C. Standage, *Phot. N.* xxxv., 449-451, 458-459.)

FILMS AND SUPPORTS.

Celluloid films that are of no value may be freed from gelatine by treatment with soda and hot water, and the celluloid may be dissolved in 50 times its bulk of amyl-acetate, and the solution used for coating negatives, etc. (*Phot. N.* xxxv., 767, from *Phot. Nct.*)

Acworth prepares a film of flexible gelatine or isinglass, using a temporary support of American cloth or other suitable material, and dips the film into a solution of 3 to 6 per cent. of nitrocellulose or pyroxilin in a mixture of amyl alcohol and amyl acetate. The film is thus made practically waterproof on both sides. It is dried in a current of dry air, or in a warm room, or in a specially constructed chamber containing air heated to about 200° F. (*Eng. Pat.*, 13,836, Sept. 3, 1890.)

Foxlee (*Eng. Pat.*, 3,393, March 4, 1890) coats paper with indiarubber or some other waterproof material, then with gelatine containing sufficient alum to make it insoluble, then with celluloid or other pyroxilin compound, and finally with gelatino-bromide emulsion. When the emulsion is dry, the back of the paper is moistened with a solvent of the waterproofing substratum, and the film is stripped from the paper.

Planchon (*Eng. Pat.*, 14,189, Sept. 9, 1890) attaches films to rigid frames before the solvents have evaporated, and in this way the film, when dry, is kept tight and smooth.

In the preparation of flexible films of nitrocellulose or celluloid, the solution may be spread on a flexible support, previously coated with gelatine or other substance unaffected by the celluloid or nitrocellulose solution. The preliminary coat must be calendered or polished with talc, and after the celluloid solution has set the flexible support is hung up to dry, and the film is stripped from the support. The film may, of course, be coated with sensitive emulsion before stripping. (J. W. Swan and J. Leslie, *Eng. Pat.*, 9,893, June 26, 1890.)

The solvents used in the manufacture of flexible films can be recovered by passing the coated support through a heated chamber from which the vapours of the solvents are drawn into a condensing apparatus. (B. J. Edwards, *Eng. Pat.*, 11,945, July 30, 1890.)

EMULSIONS.

For adding silver nitrate solution slowly, and in small quantities, E. Vogel recommends (*Phot. Mitt.* xxviii., 41) the apparatus used by Witt for diazotising. A conical flask is fitted with a cork, bored with two holes, through one of which passes the stem of a globular funnel, the lower part of the stem being drawn out to a very fine point, and bent so that it nearly touches the side of the flask. Through the other hole passes a short straight piece of glass tube, the upper end of which is easily closed by the thumb or finger. The bromised gelatine or collodion is put in the flask, and the silver nitrate solution is poured into the funnel until the latter is half full. The silver solution issues slowly from the drawn-out neck of the funnel, and by shaking the flask the liquid can easily be kept in rapid rotation.

A jacketed funnel and water bath for melting and filtering emulsions is described in *Phot. A.* xxxii., 149-151.

W. Rebikow proposes to use agar-agar in place of gelatine for the preparation of emulsions. (*Germ. Pat* 565-73, June 20, 1890. *Phot. A.* xxxii., 141-143.)

F. Wilde states (*Phot. W.* xvii , 33-35 and 43-45) that the tendency sometimes shown by gelatine to dry with pits and hollows is not due to the presence of grease, because it is observed after all grease has been removed by chemical treatment, and cannot be produced by addition of small quantities of grease to pure gelatine. Incidentally it was found that the addition of small quantities of grease, etc., tends to the production of fog. The formation of pits and hollows is prevented by the addition of common salt and other antiseptics, but the use of these substances is inadmissible in the preparation of emulsions. The tendency to the production of black marks, etc., where the plates are in contact with the packing paper, etc , is much lower when the emulsion contains a large proportion of gelatine.

Meldola expresses the view that the increase of sensitiveness resulting from the heating of gelatino-bromide emulsion is due to a chemical change, and not merely to physical modification. (*J.S.A.*, 1891.)

Collodion Emulsion.—Highly sensitive collodion emulsion plates may be prepared in the following way (W. T. Wilkinson, *Phot.* iii., 466):—Dissolve zinc bromide 160 grs., ammonium lactate 40 minims, and soft gelatine 100 grains in 3 ozs. of water. Add slowly, with vigorous stirring, 320 grs. of silver nitrate previously dissolved in 2 ozs. water, and then 30 drops of nitric acid. Heat for five or six hours at 200° F., cool to 100° F. and add 5 ozs. of a cold saturated solution of barium chloride, and agitate briskly. Next morning the gelatine will be liquid and the silver bromide at the bottom of the vessel. Pour off the gelatine and wash the silver bromide on a filter with four or five quantities of hot water and three changes of methylated spirit. Then mix it with 10 ozs of methylated spirit, add 100 grs. of pyroxilin and 10 ozs. of ether, and shake vigorously. Filter in the usual way. Coat the plates with an albumen substratum. Develop with pyro and soda or any developer not containing ammonia.

Keeping Properties of Plates.—H. R. Leech (*Phot.* iii , 856-857) cites many examples of plates that have been kept for a long time before being exposed, and of others that were kept between exposure and develop-

ment. The oldest plates were eleven years old and remained good; the longest time between exposure and development was three years, the negatives being good.

A. Pricam (*R. Phot.* iii., 318-319) has used, in 1891, Liverpool dry plates (collodio-bromide) made in 1872-1874. They retained all their original sensitiveness, but the film showed a great tendency to leave the glass. His general experience shows that the keeping power of gelatino-bromide plates is inversely as their sensitiveness.

Collodio-chloride emulsion for transparencies. (*B.J. Phot.* xxxviii., 738-740, 754-755.)

Purity of materials and sensitiveness in emulsion work. (*B.J. Phot.* xxxviii., 210-212, 228-229, 243-245.)

Bromide Paper can be prepared as follows:—200 grs. Coignet's gelatine, 82 grs. potassium bromide, 2 grs citric acid, and 2 grs. chrome alum are dissolved with aid of heat in 8 ozs of water. 110 grs. silver nitrate is then added in large crystals and vigorously shaken for about five minutes. After standing 15 minutes, pour into a dish, wash, etc., as usual. Albumenised paper is passed through boiling water in order to coagulate the albumen, and pieces are placed with the albumenised face upwards on pieces of glass of exactly the same size, the paper being so thoroughly moistened that it lies quite flat. When ready for coating pass a *slightly* damp sponge over the surface, and pour on the warm *but not hot* emulsion. drain off the excess, leaving a fairly thick coating, rock and place on a level shelf. The emulsion is somewhat slow. Develop with ferrous oxalate and be careful to clear thoroughly with citric or tartaric acid. (C. Huffel, *Phot. N.* xxxv., 263.)

Gelatino-chloride Emulsions. B. Koulgenko gives the following formula for gelatino-chloride emulsion Make separately—A, common salt 11 parts, soft gelatine 25 parts, distilled water 200 parts; B, silver nitrate 30 parts, distilled water 50 parts; C, hard gelatine 25 parts, distilled water 250 parts. When dissolved at a gentle heat in a water bath, mix B and C and then add A with vigorous agitation Digest for some moments and pour out into a dish to set. Proceed as usual, but prepare the plates for coating hy dipping in—hard gelatine 1 part, distilled water 300 parts, chrome alum solution (2 in 100) 6 parts, and drying. Develop with ferrous oxalate. A print-out emulsion is prepared with the following solutions:—A, common salt 4 parts, potassium citrate 4 parts, distilled water 48 parts; B, mixed gelatine 16 parts, distilled water 160 parts; C, silver nitrate 15 parts, distilled water 48 parts. A convenient toning bath is—potassium sulphocyanide solution (1 in 50) 100 parts, distilled water 100 parts, gold chloride solution (1 in 50) 5 parts. (*R. Phot.* iii., 139-140.)

Gelatino-citro-chloride Emulsion for Printing-out may be made hy means of one of the following formulæ:—No. 1 B, soft gelatine 80 grs, ammonium chloride 80 grs., citric acid 120 grs., water 8 ozs. No. 2 B, the same with addition of 45 grs anhydrous sodium carbonate. No. 3 B, soft gelatine 80 grs., ammonium chloride 80 grs., citric acid 60 grs, sodium carbonate anhydrous 80 grs, water 8 ozs The same A solution is used in all three cases—silver nitrate 400 grs, water 4 ozs. Formula No. 1 is suitable for dense negatives, No. 2 for medium negatives, No. 3 for thin negatives. A is slowly added to B at a temperature of 110-120° F. (it should not exceed

120° F.), and after filtering the emulsion through a double thickness of cambric it is ready for use. If it has to be kept for some time, 10 per cent. of alcohol containing a small quantity of thymol should be added, but even with this addition emulsion No. 3 will not keep very long. The paper is best coated by floating, but the emulsion may be brushed on the previously damped paper, not fewer than two coatings being given, the second as soon as the first is surface dry. Printing takes place very rapidly, and the prints are toned with gold or platinum, preferably with Clark's platinum toning solution. If his formula 1 or 2 is used, a considerable proportion of common salt is added, and the prints are put in dry; with solution No. 3 the prints are first washed with a dilute solution of citric acid. The emulsions are applicable to wood surfaces (W. K. Burton, *Cam. C. J* v., 136-138).

Gelatino-Chloride Emulsion with Resin. — If gelatino-chloride emulsion made by Ashman's formula is washed once or twice, re-melted, and mixed with a solution of 180 grains of fresh white lac in 2 ozs. of alcohol for every 85 grains of silver nitrate in the emulsion, the emulsion can be spread on paper, or the paper can be floated on the emulsion, and prints with a fine matt surface can be obtained. (*A. Phot.* xiv., 24.)

Collodio-chloride Emulsion for printing-out transparencies, can be obtained by the following formula:—Pyroxilin (powdery) 4 grs., calcium chloride 5 grs., citric acid 1 gr., silver nitrate 16 to 17 grs., ether ½ oz., alcohol ½ oz. The plates should have a gelatine substratum. (*B. J. Phot.* xxxviii., 723.)

DEVELOPMENT AND DEVELOPERS.

Mercury Vapour will develop no image on exposed brom-iodide or bromide plates. (T. Bedding, *B. J. Phot.* xxxviii., 184.)

Developing Power and Chemical Constitution.—Andresen's experiments show that mono-substitution derivatives of benzene have no power as developers. Di-substitution derivatives containing the amido-group or the hydroxyl group, or both, reduce silver salts that have been exposed to light, but are without action on unexposed silver compounds. The aldehyde group seems to be entirely without influence. Developing power is shown to the greatest extent by para-derivatives, and in a somewhat lower degree by ortho-derivatives, whilst the meta-derivatives are not developers. The exact mode of action of the developer is uncertain, but it seems that quinone or a similar compound is not formed. (*Phot. Mitt.* xxviii., 124-126.)

Solutions of ammonium bromide or potassium bromide containing two grains per ounce, and solutions of ammonia containing four minims per ounce, do not dissolve a recognisable quantity of silver from exposed or unexposed gelatino-bromide plates in fifteen minutes. (*B. J. Phot.* xxxviii., 753-754.)

New Theory of the Developable Image. Preliminary notice. (C. J. Leaper, *B. J. Phot.* xxxviii., 231.)

Comparison of Developers.—V. Angerer has compared the following developers:—(1) ferrous oxalate, with addition of hypo and potas-

sium bromide; (2) quinol with potassium ferrocyanide (Lainer's formula); (3) crystallos; and (4) quinol and eikonogen. He finds that (1) gives fog easily and detail with difficulty; (2) gives much detail, great opacity, and some fog; (3) gives much detail, too much opacity, but no fog, and he recommends (A) quinol 7·5 parts, eikonogen 22·5 parts, sodium sulphite 150 parts, water 1,250 parts; (B) potassium carbonate 75 parts, water 250 parts. One part of B is added to 5 parts of A. (*Phot. W.* xvii., 156-157.)

Burton has made a series of experiments on the relative behaviour of pyro, quinol, and eikonogen, and mixtures thereof (*Phot.* iii., 179-180). A mixture of pyro and eikonogen has little advantage over either developer alone; a mixture of quinol and eikonogen is distinctly better than either developer alone. Development with either pyro or quinol, followed by treatment with eikonogen, has advantages over simple development with pyro or quinol, but nothing seems to be gained by following development with eikonogen by treatment with pyro or quinol.

E. Chable (*R. Phot.* iii., 179-185, 219-228) insists on the importance of using for each particular brand of gelatino-bromide plate the developer that is best suited to it, and states that the idiosyncrasy of the plates in respect to their behaviour with different developers is more strongly marked the higher the sensitiveness. Pyrogallol he regards as the best all-round developer, and he points out that development with ferrous oxalate is affected to a much greater extent by a low temperature than development with pyro.

Reactions of Developers.—Cupric acetate with eikonogen gives a green solution which deposits red cuprous oxide on warming; quinol gives a yellow solution which deposits cuprous oxide when boiled; hydroxylamine gives a colourless liquid which remains colourless when heated; pyrogallol gives a grey-black precipitate which is not altered by boiling and contains no copper. Iodine and bromine form with quinol and eikonogen readily crystallisable compounds; pyrogallol decolourises bromine water, but no crystalline compound is obtained. Concentrated bromine water or an alcoholic solution of iodine is added to a strong solution of the quinol or eikonogen. The crystallisable compounds quickly separate and are very slightly soluble in water. Both eikonogen and quinol have a great attraction for bromine, but brominated eikonogen and brominated quinol have no developing power. (J. Schnauss, *Phot. A.* xxxii., 258-261.)

Protection of the Fingers from the action of strongly alkaline developing solutions, etc., is obtained by rubbing them well over with vaseline and wiping them on a soft cloth before commencing manipulations. (*Phot. W.* xvii., 229.)

Kandeler, when developing Gaedicke's grainless plates (*Annual* i., 81) adds to 100 cc. of the developer 2 drops of a 10 per cent. solution of ammonium bromide, and 30 drops of a 10 per cent. solution of ammonium nitrate. (*Phot. W.* xvii., 18.)

Catechol (pyrocatechin) is an excellent developer for transparencies, and, when used without sulphite, gives a brownish deposit without staining the film. In presence of sulphite the deposit is grey-black. The following solutions may be used:—(A) potassium carbonate 1 part, water 10 parts. (D) catechol 1 part, distilled water 50 parts. For very soft transparencies

use—D 3 parts, A 20 parts, water 60 parts. Development is slower than with pyro, and a longer exposure must be given. Ordinary and not acid fixing solution must be used. When transparencies are required with more contrast use—D 10 parts, A 20 parts, water 60 parts, and, if necessary, a small quantity of potassium bromide, which acts as a powerful restrainer and necessitates a longer exposure. If the plates frill, use 20 parts of D and only 10 parts of A, with the same proportion of water. Many kinds of plates give the best result with these proportions and a small quantity of potassium bromide, provided that sufficient exposure is given. The developer rapidly loses strength, but several plates may be developed in the same quantity of liquid if the work is done rapidly. An acid fixing bath changes the colour of the deposit to yellowish-brown. (Eder and Valenta, *Phot. Corr.* xviii., 517-519.)

Catechol in dilute solution develops slowly, but gives excellent detail and opacity. It has a powerful tanning action on the gelatine, and therefore is especially suitable for hot climates. Make the following solutions:—(A) catechol 1 part, water 100 parts; (B) potassium carbonate 20 parts, water 100 parts. For each ounce of developer take—A, 8 to 12 minims; B, 30 to 50 minims. (G. W. Baskett, *A. Phot.* xiv., 11.)

Crystallos, according to Lainer (*Phot. Corr.* xviii.. 42 and 224), consists of eikonogen, quinol, sodium sulphite, potassium ferrocyanide and a caustic alkali.

Eikonogen oxidises in presence of air in neutral as well as in alkaline solutions, but the presence of a caustic alkali or an alkaline carbonate accelerates oxidation. It reduces silver oxide and silver carbonate without presence of an alkali and reduces silver nitrate in an acid solution, reduction being limited, however, by the nitric acid that is set free. Eikonogen alone will not reduce insoluble silver salts (chloride, bromide, iodide), but reduces them slowly if mixed with a sulphite, and instantly if mixed with an alkaline carbonate. Experiments made in the same way as in the case of quinol (*Annual* i., 86) show that 0·33 part of eikonogen is required to reduce one one part of silver nitrate, the addition of an equivalent quantity of an alkali being also necessary, viz., 0·33 parts of caustic potash or 0·235 parts of caustic soda, or 0 406 parts of potassium carbonate, or 0 841 parts of sodium carbonate. The quantity of sodium sulphite required to keep the solution colourless is the same whether a caustic alkali or an alkaline carbonate is added, and is ten times the weight of the eikonogen. In absence of an alkali the quantity of sulphite necessary is five times the weight of the eikonogen. According to the author quinol has four times the reducing power of eikonogen and is preferable, although the latter acts more rapidly. (H. Reeb, *B. Belge Phot.* [2] viii., 76-83.)

Borax may be used with eikonogen in place of sodium carbonate, the following proportions giving good results:—Eikonogen 1 part, sodium sulphite 2 parts, borax 2 parts, water 100 parts. Quinol with borax alone is of little value, but quinol with borax and sulphite is much more satisfactory. Lithium carbonate works well with quinol. (J. Waterhouse, *Phot. N.* xxxv., 547-548.)

E. Kastner points out that eikonogen solutions, like solutions of ferrous sulphate, remain unchanged for a long time if the bottles containing them

are filled up to the neck and tightly stoppered. (*Phot. A.* xxxii., 325-326.)

(A) Eikonogen 5 parts, sodium sulphite 10 parts, distilled water 100 parts; (B) Caustic potash 5 parts, distilled water 100 parts. Mix in equal volumes. (J. J. Acworth, *A. Phot.* xiii., 330.)

Hydroquinone.—(See Quinol).

Kinocyanine is a hye-product formed in the manufacture of kyanol (Paris hlue). It is an amorphous powder, or violet-blue imperfectly formed crystals, soluble in water, alcohol, ether, etc. The solutions are first green, then violet, hut become cherry-red with a slight fluorescence on addition of a few drops of hydrochloric acid. A similar change is produced by sulphites and sulphurous acid. Its formula is prohably $C_{25}H_{12}O_{10}$, and it is a powerful reducer of metallic salts, and hence may be used as a developer. Mix kinocyanine 10 parts, sodium sulphite 50 parts, caustic soda, one part, sodium carbonate 140 parts, water 1,000 parts, and filter. Five to eight plates may be developed in one quantity of the liquid. The solution may be kept for a long time in well-stoppered bottles. (J. Conscience, *W. Phot M.* xxviii., 316, from *Annales Phot.*)

Paramidophenol forms two series of salts; one with acids, which crystallise readily and dissolve easily in water, but are decomposed by alkaline carbonates with (in strong solutions) precipitation of the paramidophenol; the other with alkalies, very easily soluble even in cold water. 30 parts of potassium metabisulphite is dissolved in 100 parts of water, and 10 parts of paramidophenol hydrochloride is dissolved in the solution. A strong solution of caustic soda is now added, until the precipitate that forms at first is just redissolved. For use this solution is diluted with from 5 to 50 times its volume of water. Lumiére's formula gives too strong a solution. The following is hetter:—Paramidophenol hydrochloride 5 parts, sodium sulphite 50 parts, potassium carbonate 25 parts, water 1,000 parts. (Andresen, *Phot. Mitt.* xxviii., 124 126.)

Paramidophenol, when its aqueous solution is exposed to air, oxidises more rapidly than eikonogen or quinol, a black precipitate being formed, which dissolves in alkalis, forming a violet solution, and in nitric acid, forming a red solution. Gelatine, however, remains quite colourless in presence of the products of oxidation of paramidophenol. Neither paramidophenol, quinol, nor eikonogen will reduce the haloid salts of silver without addition of an alkali, although they will reduce soluble silver salts without any such addition. Paramidophenol has a slightly acid reaction, gives a blue violet colouration with ferric chloride solution, and no precipitate with lead nitrate. Potassium bromide or hypo (sodium thiosulphate) when added to the paramidophenol developer, produces the same results as with other developers. Adopting Reeh's method of experiment, it is found that the complete reduction of one part of silver nitrate requires 0·07 part of quinol, 0 14 part of paramidophenol, and 0·30 part of eikonogen, differences which are, however, not important in practice, since a developer always contains an excess of the reducing agent. The following solution is recommended:—Paramidophenol 8 parts, potassium carbonate 40 parts, sodium sulphite 100 parts, water 800 parts. (A. and L. Lumière, *B. S. F. Phot.* [2] vii. 232-236.)

Paramidophenol dissolves readily in solutions of caustic potash, caustic soda, or caustic lithia. A solution of 30 parts caustic potash, or 25 parts caustic soda, or 4 to 5 parts caustic lithia in 1,000 parts of water, will dissolve 20 parts of paramidophenol. Solutions containing large proportions of caustic alkalies are, however, inconvenient, and a better solution is—Sodium sulphite, 250 parts; caustic lithia, 5 parts; paramidophenol, 20 parts; water, up to 1,000 parts. The solution must he kept in well closed hottles, which should he as full as possible. As many as 50 negatives can be developed in one quantity of the solution, hut the time required for development hecomes longer and longer. In the case of under-exposed plates the developer is diluted with water. (A. and L. Lumière, *Mon. Phot.* xxx., 146-148.)

Eder and Valenta (*Phot. Corr.* xviii., 310-313) have investigated the behaviour of paramidophenol. They found that the most nearly colourless solution is ohtained when the sodium sulphite and potassium carbonate are first dissolved in water, and the paramidophenol added at the end. Solution takes place somewhat slowly, and with 1 to 1·2 parts of paramidophenol per 100, some of the compound crystallises out on standing. Experiments were made with solutions of this strength (Lumière's formula), and also with solutions containing only 0·4 per cent. The concentrated paramidophenol soda developer acts more rapidly than pyro-soda, quinol-potash, or catechol-potash, the opacity and the sensitomer numher heing the same as with pyro. When diluted with three times its volume of water the developer acts more slowly, hut gives abundant opacity and the same sensitometer number. Potassium bromide has the same effect as with pyro-soda. Paramidophenol developer that has been frequently used acts more slowly, and gives stronger contrasts, but loses its developing power much more slowly than pyro, under similar conditions. The solution does not darken, and the film is not stained. The colour of the image is grey-black, and has no blue or green tinge, even when a neutral fixing hath is used. Paramidophenol with potassium carbonate hehaves similarly, but acts more rapidly. As a rule the potash developer is to he recommended for plates with a tendency to give too little contrast, whilst the soda developer tends to give softer images. Both, however, will give every degree of softness or intensity. Since dilute solutions answer equally well as developers, the tendency to crystallise out is avoided, and the cost is less, the authors recommend the following formulæ:—

A—Paramidophenol soda:—Paramidophenol 4 parts, sodium carbonate (anhydrous) 40 parts, sodium sulphite 80 parts, water 1,000 parts.

B—Paramidophenol potash:—Paramidophenol 4 parts, potassium carhonate 40 parts, sodium sulphite 120 parts, water 1,000 parts.

Paramidophenol gives excellent results as a developer for transparencies, and several plates may he developed in the same quantity of solution. With caustic potash paramidophenol makes a very energetic developer.

Paramidophenol with neutral sodium sulphite has distinct developing power without addition of any alkali.

Miethe (*Phot. W.* xvii., 382-384) confirms Eder's results with paramidophenol and caustic potash. He finds that the rate of development is the same as with quinol and caustic potash or quinol and potassium carhonate, the highest sensitometer number ohtained being the same in all three cases, and the gradations similar. No tendency to yellow fog was recognisable, and the

plates were much clearer with paramidophenol than with quinol. Miethe recommends (A) paramidophenol 4 parts, sodium sulphite 35 parts, potassium ferrocyanide 30 parts, water 600 parts; and (B) caustic potash 5 parts, potassium carbonate 40 to 50 parts, water 600 parts. Rodinal (*ibid.* 389-391), even when diluted with 50 times its volume of water, has a developing power equal to that of the rapid quinol developer, and gives much greater density in the feebly lighted parts of the image. It gives much softer negatives than quinol, especially in cases of under-exposure. The solution darkens very slowly when exposed to air, and several plates can be developed in the same quantity of liquid. Over-exposure is corrected by diluting the developer and adding potassium bromide, which acts very powerfully, and may easily give hard negatives. If good density is not obtained add to 100 parts of diluted rodinal, a solution of quinol 5 parts, sodium sulphite 10 parts, water 100. A clear, dense, grey-black image is obtained even if there has been considerable over-exposure.

Formulæ.—Paramidophenol, 12 parts; sodium carbonate, 100 parts; sodium sulphite, 200 parts; water, 1,000 parts.

Paramidophenol, 12 parts; lithium carbonate, 12 parts; sodium sulphite, 200 parts; water, 1,000 parts. (A. and L. Lumière, *Mon. Phot.* xxx., 78-79.)

Paramidophenol 1¼ parts, sodium sulphite 30 parts, potassium carbonate 4 parts, water 300 parts. (Beach, *Phot. W.* xvii, 418.)

Paramidophenol 1 part, sodium sulphite 25 parts, water 250 parts, gives very clear images of a fine colour, and may be used for diapositives or bromide paper (Beach, *ibid.*)

Pyrogallol (Pyrogallic Acid).—L. Degoix gives the following pyro developer with lime dissolved in sugar as the alkali:—(A) Pyro, 10 parts; sodium sulphite, 20 parts; citric acid, 2 parts; water, 120 parts. (B) A saturated aqueous solution of cane sugar, saturated with lime. Add 2 parts of A to 80 parts of water; soak the plate therein for a short time, and add 1 to 2 parts of B. (*B.J. Phot.* xxxviii., 582, from *Phot. Gaz.*)

When long development is necessary, pyrogallol is superior to all the other developing agents (Neuhauss, *Phot. W.* xvii., 305-308).

American Platemakers' Developing Formulæ (A. H. Calderwood, *Phot. T.* xxi., 588):—

Seed or Harvard	Pyrogallol	27 grs.	Water, 6 to 8 ozs.
	Sodium sulphite	180 ,,	
	Sodium carbonate	120 ,,	
Cramer	Pyrogallol	15 grs.	Water, 6 to 8 ozs.
	Sodium sulphite	238 ,,	
	Sodium carbonate ..	120 ,,	
Phœnix	Pyrogallol	30 grs.	Water, 6 to 8 ozs.
	Sodium sulphite	216 ,,	
	Sodium carbonate	108 ,,	

Quinol.—Reeb has previously shown (*Annual* i., 86) that when using the quinol developer the best results are obtained with quinol, alkali and sulphite, in chemically equivalent proportions. He now finds that a 10 per cent. solution of sodium sulphite will, in 15 to 30 minutes, remove all the silver bromide from an ordinary gelatino-bromide plate, and the same result

follows with a developer containing 8 to 10 per cent. of silver sulphite. A plate that has been exposed to light is somewhat less rapidly attacked by the sulphite than an unexposed plate. It is clear, however, that a plate cannot without injury be allowed to remain for a long time in a developer containing a large proportion of sulphite. He states that perfectly pure sodium carbonate confers no developing power on quinol, and that the only result of leaving an exposed plate in a solution of quinol, pure sodium carbonate, and sodium sulphite is the gradual removal of the silver bromide from the film. Moreover, a solution of this kind rapidly absorbs oxygen from the air, and he concludes that in preparing the quinol developer the use of alkaline carbonates must be avoided. He recommends that after development the negative should be immersed in a two per cent. solution of citric or tartaric acid. (*B.S. F. Phot* [2] vii , 69-73.)

Demole points out (*R. Phot.* iii., 131-133) that a large quantity of the alkali added to a developer always remains unchanged, and that in the process of development a continually increasing quantity of alkaline bromide passes into the developer and operates against the reducing action of the quinol.

Reeb replies (*ib.* 210-214) that Demole's statements are correct, and points out that a large proportion of the quinol also remains unaltered at the end of the development, and that excess of alkali and quinol (in equivalent proportions) is required to counteract the influence of the soluble bromide that is formed during development.

Demole points out (*ibid.*) that if Reeb's hypothesis of the equivalency of the alkalies were correct a developer containing sodium carbonate would be as energetic as one containing an equivalent quantity of caustic soda, which is not the case. Direct quantitative experiment shows that the latter has far greater reducing action on silver bromide than the former.

Reeb (*ib.* 311-315) calls attention to his second paper in which he states that pure alkaline carbonates have no developing power in conjunction with quinol, but Demole rejoins that this is a direct contradiction of Reeb's previous statement that chemically equivalent quantities of caustic alkalies or alkaline carbonates have the same effect. Demole finds that carefully purified potassium carbonate, free from every trace of caustic potash, when mixed with quinol and water only (quinol 2 parts, potassium carbonate 4 parts, water 100 parts) gives a powerful developing solution.

Quinol solutions darken when exposed to air less readily in presence of caustic alkalis than of alkaline carbonates, the darkening being least with caustic potash. For development prepare the following solution:—(A) Sodium sulphite 25 parts, quinol 2 parts, water 100 parts. Dissolve the sulphite in the water and then add the quinol. A caustic alkali solution (B) is prepared with caustic potash 10 parts, potassium ferrocyanide 5 parts, water 100 parts; and a bromide solution (C) with potassium bromide 1 part, water 10 parts. For instantaneous exposures take A 80 parts, water 40 parts, C 2 parts. Mix with 3 parts of B, and if this is not sufficient add more of B, in small quantities at a time, until the desired result is obtained. The developer can be used many times, but the addition of a small quantity of alkali is usually necessary. A good plan is to mix 6 parts of old developer with 4 parts of solution A and add more alkali if required. For time exposures take A 40 parts, water 80 parts, C 6 parts, and add the alkali in small quantities at a time. In order to prevent the negatives from becoming at all

yellow, they should be immersed before fixing for about a minute in a 2½ per cent. solution of tartaric acid, which attacks the gelatine less than citric acid. (G. Balagny, *Hydroquinone et Potasse*)

Lainer (*Phot. Corr.* xxviii, 6-12) has examined various modifications of the quinol developer with caustic potash or caustic soda as the alkali, and with potassium ferrocyanide as a restrainer, in place of bromides. The following formulæ are recommended:—1. (A) Quinol 10 parts, sodium sulphite 25 parts, water 600 parts; (B) caustic potash 50 parts, water 100 parts. Mix 60 parts of A with three parts of B. Development is complete in about 45 seconds, but the developer is too energetic for many plates, and gives general fog. The addition of about 12 per cent. of potassium ferrocyanide to the developer yields very clear but very hard negatives. The following formula (2) is the most powerful modification of the quinol developer:—(A) Quinol 10 parts, sodium sulphite 40 parts, potassium ferrocyanide 120 parts, water 1,000 parts; (B) caustic potash 50 parts, water100 parts. Mix 60 parts A with 6 parts B. Development is complete in 30 to 45 seconds, there is no fog, the gradations are good, and the opacity of the detail in the shadows is good, even with short exposures. An increase in the proportion of caustic potash or of sodium sulphite, or a reduction in the proportion of quinol leads to less opacity for the same time of development. Formula 3 gives somewhat softer and very clear negatives:—(A) Quinol 10 parts, sodium sulphite 30 parts, potassium ferrocyanide 90 parts, water 950 parts; (B) caustic soda 30 parts, water 90 parts. Mix 60 parts A with 12 parts B. Formula 4 is specially suitable for portrait work, and is superior in this respect to pyro-soda. Development is complete in 1½ to 2 minutes, the gradations are good, and the shadows clear:—(A) Quinol 10 parts, sodium sulphite 35 parts, potassium ferrocyanide 25 parts, water 1,000 parts; (B) caustic potash, 50 parts, water 100. Mix 60 parts A with 6 to 9 parts B, or with 10 to 12 parts; caustic soda 30 parts, water 90 parts. In order to be able to mix the two solutions in equal parts the formula may be modified thus—5. (A) Quinol 10 parts, sodium sulphite 35 parts, potassium ferrocyanide 25 parts, water 550 parts. (B) Caustic potash 50 parts, water 550 parts, or caustic soda 60 parts, water 550 parts.

For a *concentrated rapid quinol developer* mix (A) quinol 10 parts, sodium sulphite 25 to 30 parts, potassium ferrocyanide 25 parts, water 200 parts; (B) caustic potash 50 parts, water 100 parts, or (C) caustic soda 30 parts, water 90 parts. For use take A 10 parts, water 40 parts; B, 6 to 8 parts; or C, 10 parts. If 300 parts A is mixed with 100 parts B a mixed developer is obtained which only requires diluting with 10 to 30 parts of water for use. Solution A in formula 4 can be used with the alkaline carbonates, it being mixed with an equal volume of potassium carbonate 1 part, water 10 parts; or sodium carbonate 1 part, water 5 parts. Development requires about three minutes in the first case, and four to five minutes in the second.

If the caustic potash or caustic soda developer is diluted with an equal volume of water, development requires a longer time, but the same amount of detail is obtained. Potassium bromide has a strong restraining action, and its use leads to loss of detail in the shadows. Hypo (sodium thiosulphate) also acts as a retarder, but its use for this purpose is not to be recommended. The developed plates should be well washed and then fixed in the acid fixing bath.

When the rapid developer is used constantly, it is advisable to dip the fingers from time to time into water acidulated with sulphuric acid, in order to minimise the corrosive action of the caustic alkali on the skin.

Lainer finds (*Phot. Corr.* xviii., 315-318) that when using the rapid quinol developer for ordinary shutter exposures the addition of a small quantity of potassium bromide is a decided advantage. He recommends the following solutions:—(D) Quinol 10-12 parts, sodium sulphite 80 parts, potassium ferrocyanide 30 parts, potassium bromide 1 to 2 parts, water 1,000 parts. (A) Caustic potash 50 parts, water 100 parts. Mix, as a rule, 60 parts of D with 6 to 8 parts of A, but the best plan is to add the alkali gradually. The strengths of these solutions may be modified so that the two liquids are mixed in equal proportions.

Yellow stains occur chiefly when the developer has been used too often, or when the negatives have not been sufficiently washed before putting them in the acid fixing bath. The plate may be immersed for a short time in water containing 1 to 2 parts of hydrochloric acid per 1,000, and then in pure water before fixing. Yellow-stained negatives may be cleared by Imbault's method, which consists of dipping them into a solution of potassium ferricyanide 1 part, water 900, until they show no yellow colour after being washed, and they are then again put into the fixing solution.

Different brands of plates require slightly different modifications of the quinol developer in order to give the best results. This modification is, as a rule, an alteration in the proportion of alkali. Small quantities of a solution of potassium bromide, 1 in 10, should be used in case of over-exposure. (Lainer, *Phot. Corr.* xviii., 171-174.)

Pellechet has modified Lainer's quinol formula as follows:—Water (hot) 1,000 parts, sodium sulphite 200 parts, quinol 40 parts. For use, 20 to 25 parts of this solution are diluted with 100 to 125 parts of water, and gradually mixed with the solution of potassium ferrocyanide and alkali. (*Phot. A.* xxxii., 320.)

A small quantity of an alcoholic solution of iodine, when added to the quinol developer, acts as a powerful accelerator of development, and yields soft and sometimes even flat negatives. It is consequently a useful addition to a quinol developer that gives too strong contrasts. Iodine in small quantity in the eikonogen developer does not accelerate development, but otherwise acts in the same way as with quinol, though in a much less marked manner. (Lainer, *Phot. Corr.* xviii., 12-13; compare *Annual* i., 83).

Turpentine when added in small quantity to the quinol developer acts as a very powerful accelerator, but large quantities are injurious; 6 drops to 100 cc. ($3\frac{1}{2}$ oz) is sufficient. (M. Wolf and P. Lenhard, *Phot. Corr.* xviii., 600, from *Phot. Gaz.*)

Miethe uses the quinol developer in the following way:—Quinol 10 parts, sodium sulphite 40 parts, potassium carbonate 75 parts, water 1,000 parts. If the proportion of alkali is reduced, the negatives are very clear, but are hard and wanting in half-tone. Most plates show some fog due to the long time required for development. If a small quantity of pyro is added just before use, development is greatly accelerated, and the image is clear without being hard. For soft images (*e.g.*, portraits), quinol 1 part, sodium sulphite 6 parts, potassium carbonate 7·5 parts, water 100 parts pyro 0·2 parts; for hard images (*e.g.*, micro-photographs), quinol 1 part, sodium sulphite 7 to 8 parts,

potassium carbonate 7·5 parts, water 100 parts, pyro 0·4—0·5 parts. (*Phot. W.* xvii., 133-134)

O. Lohse finds that resorcinol (resorcin) acts as a strong retarder when added to the quinol developer, but a small proportion of resorcinol greatly increases the stability of the solution even when exposed somewhat freely to air. He recommends—quinol 7·5 parts, resorcinol 0 4 parts, sodium sulphite 30 parts, caustic soda 20 parts, water 1,000 parts. (*Phot. W.* xvii., 45.)

Rodinal is a concentrated solution of paramidophenol, prepared by the Actien Gesellschaft für Anilin Fabrikation. For use as a developer it merely requires to be diluted with 20 to 40 parts of water.

P. Baltin has used large quantities of rodinal, and confirms generally the statement of the vendors, but finds development somewhat slow. The scarcely alkaline rodinal developer is found to attack the fingers and make the skin very tender. (*Phot. W.* xvii., 415.)

Ferrous Oxalate.—A strong solution of 330 parts of potassium oxalate in 690 parts of water is obtained by aid of heat ; cool until the oxalate begins to crystallise and add ferrous sulphate 135 parts. As soon as solution is complete, cool as rapidly as possible, filter into bottles, which must be well stoppered. After some time the liquid deposits part of the ferrous oxalate. The strongest permanent solution obtainable contains 6·5 parts of ferrous oxalate in 100 parts by measure.

Safranin, according to Lainer (*Phot. Corr.* xviii., 224), is an ordinary quinol developer containing a red colouring matter.

Mixed Developers.—Pyro-quinol developer :—(A) Quinol 2 parts, water 100 parts. (B) Sodium carbonate 100 parts, water 500 parts. (C) Pyrogallol 20 parts, sodium sulphite 60 parts, water 400 parts, diluted sulphuric acid, small quantity. For use, mix A 4 parts, B 1 part, C 1 part. (Schleussner, *Phot. A.* xxxii., 95.)

Quinol-eikonogen developer :—(A) Water 1,250 parts, sodium sulphite 150 parts, eikonogen 22½ parts, quinol 7½ parts. (B) water 250 parts, potassium carbonate 75 parts. For use, mix A 5 parts, B 1 part. (Angerer, *Phot. A.* xxxii., 128.)

Quinol and eikonogen developer :—(A) Water 32 oz., sodium sulphite 2 oz. Dissolve with aid of heat, acidify with sulphuric acid, and add quinol 160 grs. (B) Water 32 oz., sodium sulphite 1 oz., potassium carbonate 4 oz., potassium bromide 64 grs. Mix equal parts of A and B ; it works quickly at 60°-70° F , but at a low temperature is very slow. (W. Bell, *W. Phot M.* xxviii., 19)

Quinol and eikonogen :—(A) Quinol 40 grs., eikonogen 120 grs., sodium sulphite 1 oz., citric acid 20 grs., distilled water 20 ozs. (B) Sodium carbonate 60 grs., caustic soda 30 grs., potassium bromide 5 grs , distilled water 20 ozs. Mix in equal volumes. (Chapman, *A. Phot.* xiii., 330.)

FIXING, REDUCING, AND INTENSIFYING.

Magnesium chloride solution (Miethe's formula, *A.* i., 97) will dissolve 1 to 2 parts of silver chloride in 1,000. (E. J. Wall, *A. Phot.* xiii., 116.)

B. Kröhnke (*Phot. A.* xxxii., 323-325) adds neutral alum to the fixing bath. It is prepared by dissolving 2 parts of alum in 10 parts of water, and

1 part of caustic soda in 10 parts of water. The alum is gradually poured into the caustic soda solution (not *vice versâ*), and the mixture is kept in well-closed bottles. From 1 to 2 per cent of this solution is added to the fixing bath, and the developed negatives are placed in it without washing away the developer.

Green-fog is readily removed by immersing the fixed but unwashed negative in hypo containing a very small quantity of potassium ferricyanide. (E. Vogel, *Phot. Mitt.* xxviii, 21-22.)

The strongly acid fixing bath has a distinct reducing effect; the negative should be left in it from 2 to 48 hours. (Lainer, *Phot. Corr.* xviii., 225.)

Demole finds that neither ammonia, nor alcohol, nor an alcoholic solution of cadmium bromide has any intensifying effect on a gelatine negative. (*Phot. Nach.* iii., 56.)

Contrasts in a negative may be greatly reduced, and the opacity of the detail in the shadows increased, by placing it in a quickly-acting intensifier for so short a time that it has no chance of penetrating into more than a small part of the thickness of the film. The uranium intensifier, sufficiently acidified, answers very well. Conversely, to reduce the detail in the shadows, place in a powerful reducing solution for a very short time. In order to reduce the opacity of the lights without materially affecting the shadows, convert the image completely into silver bromide by immersion in a mixture of ferric chloride and potassium bromide, wash thoroughly, expose to light, and re-develop, stopping development before it is complete. Then fix in order to remove the excess of silver bromide. (Chapman Jones, *Phot.* iii., 637-638)

Pyrogallol intensifier for gelatine plates:—(A Water 450 parts, citric acid 2 parts, glycerine 450 parts. (B) Water 450 parts, nitric acid 30 parts, silver nitrate 60 parts. Dilute 1 part of A with 2 parts of water, pour over the very carefully washed negative, then add a few drops of B. After intensification, wash and alum the negative. (*R. Phot.* iii., 35.)

REVERSAL OF THE IMAGE.

Reversed negatives can be obtained by excessive exposure and attention to the following conditions:—(1) The developer must be highly restrained; for general purposes use—Pyro 3 grs., sodium carbonate (crystallised) 8 grs., potassium bromide 3 grs , water 1 oz. (2) The time of exposure required varies enormously with different plates, and may be from several thousand to a million times the normal exposure. (3) There seems to be no relation between the ordinary sensitiveness of the plates and the length of exposure required to produce reversal. (4) The longer the time required to produce reversal, the softer the resulting negative and the more correct its gradations. (5) Plates that are liable to fog, or to show a positive image at the back under long development, as a rule give reversed images with comparatively short exposures. (6) Silver iodide in the film greatly increases the exposure required for reversal. (7) During development the plate by reflected light seems to be completely blackened, but the veil to a great extent disappears

in fixing. The shadows, however, are never quite clear. A large quantity of light may be used when developing the reversed negatives. (W. K. Burton, *Phot* iii., 590-591.)

Strong, vigorous, reversed images can be obtained by the addition of a very few drops of J. Emerson Reynold's tetrathiocarbamide-ammonium bromide to the eikonogen developer. In cases where the ordinary exposure for a negative with pyro development would be 60 to 90 seconds, 10 seconds was too much for a reversed image and the exposure was reduced to 2 secs. A developer that works well for reversals with thiocarbamides is, eikonogen 1 part, sodium sulphite 1 part, lithium carbonate 1 part, water 100 parts (J. Waterhouse, *Phot. N.* xxxv., 123-124.)

H. Sutton finds (*Cam. C. J* v., 168-170 and 192-194) that a preliminary exposure of the plate greatly facilitates reversal. Good results are obtained by giving the second exposure behind red gelatine. A blue screen seems to tend to prevent reversal. Failure to photograph lightning flashes may sometimes be due to the occurrence of exact neutrality between positive image and reversal.

Balagny immerses gelatino-bromide plates or films for not more than five minutes in a 3 per cent. solution of potassium dichromate, and allows them to dry in the dark after blotting off excess of solution. They will keep for about 48 hours. The bichromated plates are exposed behind a negative to diffused daylight for 10 to 30 minutes, until the detail of the image is faintly visible, and are then thoroughly washed until free from dichromate, and developed with quinol.

Measurements of the opacity resulting from exposures of increasing duration show that, although the opacities increase with the exposure up to a certain point, then decrease—afterwards again increase—it would, if the rate of increase follows the same law, require an exposure of about seven years to produce a second reversal. (H. J. L. Rawlins, *J. S. C. I.* x., 18.)

Brebner has made a number of spectrographic experiments, and states (*B. J. Phot.* xxxviii., 516-517) that the region of the spectrum which first produces transparency instead of opacity in a film of silver bromide or a commercial gelatino-bromide dry plate, is the same as that which, when the exposure is very brief, induces the change whereby through the intervention of the developer the salt is reduced to metallic silver, and deposited at those points to which the light has had easiest access.

POSITIVE PROCESSES.

I.—PRINT-OUT PROCESSES.

Albumen Prints.—Albumenised paper will render a greater range of gradation than platinotype, but the latter is far superior in its rendering of high lights. (Abney, *Phot* iii., 573-575.)

Ready sensitised albumenised paper, according to F. Wilde (*Phot. N.* xxxv., 319), is obtained by means of the following formula:—Silver nitrate 10 parts, citric acid 10 parts, alcohol 10 parts, water 120 parts. After each

sheet has been sensitised, 1 part of the following solution is added to the bath:—Silver nitrate 20 parts, citric acid 12 parts, alcohol 20 parts, water 200 parts.

Blisters on ready-sensitised albumenised paper appear chiefly when the paper is new; if it is kept for two to four weeks the tendency to form blisters disappears. (C. Sasse, *Phot. A.*, xxxii., 47.)

Bartalozzi Red Tones on silver prints may be obtained by thoroughly soaking them in a strong solution of common salt, washing once with water, and placing in a borax toning bath, where they must remain about 15 minutes, and in which they will alter but slightly in colour. (Drinkwater, *A. Phot.* xiii., 464.)

Toning Bath for albumen prints:—(A) gold chloride 1 part, water 60 parts; (B) water 1,024 parts, citric acid 48 parts, sodium bicarbonate 80 parts. For use, mix A 80 parts, B 480 parts, water 3,840 parts, calcium chloride 1 part, uranium nitrate 1 part. Tones quickly, and gives a black, purple brown, or purple colour. (J. K. Miller, *Phot. A.* xxxii., 191-192, from *Am. J. Phot.*)

Toning after Fixing.—Silver prints can be readily toned after fixing by means of the following solution:—Ammonium sulphocyanide 300 parts, gold chloride 3 parts, caustic potash 3 parts, water 1,000 parts. The bath can be used at once, keeps well, and acts rapidly. Purple colours are obtained if 50 parts of sodium carbonate are used in place of the caustic potash. For plain paper prints the bath must be diluted with two or three times its own volume of water. (Mercier, *B. S. F. Phot.* [2] vii., 241-242)

Reduction of Prints.—Albumen prints can be reduced in the following way:—Dissolve 3 parts of potassium bromide and 3 parts of ammonium bromide in 100 parts of concentrated copper sulphate solution. Dilute one part of this solution with 8 or 10 parts of water The toned and fixed prints are immersed in a strong solution of common salt, then dipped in the dilute copper solution, and afterwards in the fixing solution. The colour of the prints is not affected. (Sherman, *Phot. W.* xvii., 187-188, from *St. L. Phot.*)

Stripping from Glass.—Albumenised paper prints may be stripped from glass if the glass is cleaned and coated with a mixture of equal volumes of ox gall and alcohol, and the moist print is squeegeed down upon it and allowed to dry. (F. Wilde, *Phot. N.* xxxv., 333.)

Fading of Prints.—T. H. Voigt brings further evidence that the tendency of albumen prints to fade is increased by mounting. He has, however, some prints prepared in 1880 that still remain good, and hence mounting does not necessarily cause fading. (*Phot. Corr.* xviii., 25-28.)

Yellow Spots forming on silver prints were traced to the presence of hypo (sodium thiosulphate) in the paper used for blotting off the excess of the silver when sensitising the albumenised paper.

Collodio-chloride Prints.—D. Bachrach states that he is acquainted with a large number of collodio-chloride prints and opals that have faded or seriously deteriorated. This he attributes to the small amount of silver chloride in the print, and the small amount of gold deposited in toning. He considers platinum toning more likely to give permanence than gold toning. (*W. Phot. M.* xxviii., 248-249, 260-261, and 289-290.)

R. W. Harrison (*ibid* 290-291) has met with many collodio-chloride prints, both on paper and opal, that have remained unaltered for many years.

W. Sherman (*ibid* 354 355) states that collodio-prints on opal glass, which he made with very great care, have faded more seriously than any other prints that he has ever made. This he considers to be due to the fact that the image is composed of a really very small quantity of silver and gold.

Transferring Collodio-chloride Films from Paper to Glass.—Krause prefers to coat the glass with a solution of one part of caoutchouc in 100 parts of benzene, instead of using gelatine. After squeegeeing under cold water, and remaining under pressure for 15 minutes, the paper is treated with almost boiling water. (*Phot. Mitt.* xxviii., 256.)

Gelatino-chloride Prints Toning Bath.—Water 1,000 parts, hypo 250 parts, ammonium sulphocyanide 27 parts, lead acetate 10 parts, lead nitrate 10 parts, citric acid 7½ to 10 parts, gold chloride solution (1 in 200) 75 parts. Mix in this order, and from time to time filter or decant from the small quantity of black precipitate that separates. (Busche, *Der Amat. Phot.* v., 94.)

Toning and Fixing Bath.—(A) distilled water 500 parts, sodium acetate or phosphate 30 parts, gold chloride 2 parts; (B) distilled water 500 parts, ammonium or potassium sulphocyanide 40 parts, gold chloride 2 parts; (C) water 1,000 parts, hypo 375 parts, caustic soda 5 parts, and when dissolved add 500 parts saturated aqueous solution of alum. Add A and B slowly and with vigorous shaking to C, allow to stand 24 hours and pour off the clear liquid. (Lamy, *Phot. Nach.* iii, 126, from Helios.)

Toning Bath for Aristotype.—(A) ammonium sulphocyanide 20 parts, water 100 parts; (B) gold chloride 8 parts, potassium chloride 1 part, water 400 parts Pour B into A and allow to stand for 48 hours. (*B. Phot. C.* i., 67.)

Platinum Toning Bath for silver prints is recommended by P. Brunel. Sodium chloro-platinite 2 parts, sodium bitartrate 1 part, common salt 4 parts, water 1 000 parts. The bath will keep for a long time. The prints are washed and then immersed in the toning solution. The colours obtained are, in succession, purple, purple brown, sepia brown, and finally black. The prints are washed and fixed in the usual way. (*B.S.F. Phot.* [2] vii., 306-307)

Magnesium Chloride for Fixing.—Experiments with various toning and fixing baths containing magnesium chloride in place of hypo leads to the conclusions that replacing the hypo by magnesium chloride is by no means satisfactory; inferior tones are obtained, and the bath must contain a much smaller proportion of gold and a much larger proportion of magnesium chloride than is generally given before the prints can be regarded as permanent. (E. J. Wall, *A. Phot.* xiii., 116-117.)

Fixing Bath.—Mercier recommends the following fixing bath for prints:—Hypo (sodium thiosulphate) 150 parts, sodium sulphite 100 parts, water 1,000 parts. Any acid in the prints acts on the sodium sulphite and does not decompose the hypo. He states that the yellow colour often observed in prints toned with platinum arises from insufficient washing before fixing, and is prevented by the use of the fixing bath containing sulphite. (*B. S. F. Phot.* [2] vii. 238-240.)

Printing with Lead Salts.—Valenta points out (*Phot. Corr.* xviii., 519-520) that photo-prints obtained with films of lead iodide on paper consist of iodide of starch, and are very fugitive. (*Comp. B. J. Phot.*, p. 613.) A similar process was described by Liesegang in 1890.

Direct Platinum Printing.—(A) sodium ferrous oxalate 400 parts, sodium oxalate solution (3 in 100) 1,000 parts, potassium chlorate 1 part; (B) potassium chloro-platinite 10 parts, water 60 parts. Mix 8 parts of A with 5 parts of B, brush on the surface of the paper, and dry rapidly at about 56° C. (Wischeropp, *Phot. Nach.* iii., 381-382.)

Matt Surface Silver Paper.—The sensitising bath should contain 40 to 50 grs. of silver nitrate per fluid ounce, and should be made slightly alkaline with ammonia. Four ounces of this solution is precipitated with sodium chloride, the washed precipitate dissolved in potassium cyanide solution, and then added to 1 gallon of the silver nitrate solution. The mixture is exposed to sunlight for some time and the clear liquid poured off. After use it is returned to the stock bottle and again exposed to light. Tone the prints in a borax or sodium bicarbonate bath containing not more than 1 gr. of gold chloride in 20 ozs. (J. R. Clemons, *Phot. T.* xxi., 533-534.)

A toning bath for prints on plain paper is given by J. Krämer as follows (*Phot. W.* xvii., 52-55) :—(A) Potassium oxalate 100 parts, potassium phosphate 50 parts, water 900 parts; (B) platinous chloride 1 part, water 20 parts; mix 6 parts A with 1 part B.

Mignon Paper is a matt surface print-out paper containing silver gelatino-chloride, made by E. Buchler. It is toned with a sulphocyanide bath, and fixed in the usual way. (*Phot. Corr.* xviii., 68-70.)

Mercier adds to plain silver paper a small quantity of any ordinary uranium salt. The prints are fixed without previous washing in the ordinary fixing bath, or in the bath containing sulphite. They have a violet sepia colour, which gradually becomes darker. This darkening can be brought about at once by ironing the prints or otherwise exposing them to heat. (*B. S. F. Phot.* [2] vii., 240-241.)

Salted Paper with Resin Emulsion.—Ten parts of ammonium chloride is dissolved in 100 parts of water; 3 to 4 parts of gelatine is allowed to swell in water; 3 to 4 parts finely powdered pale yellow French colophony is saponified by adding it gradually to a hot solution of ammonia with vigorous stirring. The clear solution of resin soap is mixed with the swelled gelatine, and when the latter has dissolved, the ammonium chloride solution is added, and the mixture diluted to 1,000 parts by addition of rain or distilled water. If the ammonium chloride solution is added before the gelatine, there is danger of the precipitation of the resin soap. The diluted mixture is carefully neutralised with hydrochloric acid, and then a concentrated aqueous solution of citric acid is added until the mixture has a strong acid reaction. The resin is precipitated and forms a very fine emulsion. The paper to be sensitised is moistened with the warm solution by means of a brush, and is then allowed to float on the solution for three minutes. It is dried in a warm room, and sensitised by floating for two or three minutes on a 10 to 12 per cent. solution of silver nitrate, and dried in the dark. Before printing it is fumed with ammonia for ten minutes. If the prints are washed

for a short time and then fixed in a 10 to 15 per cent. solution of hypo acidified with metabisulphite, they dry with a pleasant red-brown colour. In order to obtain black prints, the prints are washed with water, immersed in a solution of gold chloride 0·3 parts, borax 8 parts, water 1,000, until they acquire an intense dark violet colour by transmitted light. They are then rinsed with water and placed in a solution of 1 part potassium chloro-platinite in 3,000 parts of water acidified with nitric acid. Here they quickly become black, and they are fixed, washed and dried. If fixed after treatment with gold only, the prints have a warm black colour. An acidified solution of uranium nitrate in place of the gold solution gives the prints a red colour. (E. Valenta, *Phot. Corr.* xviii., 564-567.)

Photography on Fabrics.—The fabric, if new, is carefully cleaned of all dressing, and then immersed in a solution of 20 grs. of gelatine in 10 ozs. of water (gelatine 1 part, water 220 parts), and stretched out to dry. Prepare a solution of ammonium chloride 50 grs. (5 parts), Iceland moss 30 grs. (3 parts) in water 10 ozs. (440 parts), filter, and when nearly cold, brush on the surface of the dried gelatine-coated fabric. Float the salted and dried fabric for 10 to 15 minutes on a solution containing silver nitrate 350 grs. (35 parts), alum 20 grains (2 parts), nitric acid 2 drops, water 10 oz. (440 parts). Dry, fume in the usual way, print deeply, wash, tone, and fix in the usual way. (*A. Phot. B.* xxii., 193-195.)

Prints on Silk.—Immerse the silk in a filtered solution of gum benzoin 8 parts, gum mastic (in tears) 5 parts, calcium chloride 30 parts, alcohol 1,000 parts. Dry and sensitise in a slightly acid 12 per cent. solution of silver nitrate, again dry and iron before placing in contact with the negative. Tone and fix in the same way as albumenised paper, and iron after thorough washing. (*W. Phot. M.*, xxviii., 169.)

Summaries, etc.—The Chemistry of Silver Printing. (W. Jerome Harrison. *Phot. T.* xxi.)

The Toning of Photographs considered chemically, historically and generally. (W. Jerome Harrison. *Phot. T.* xxi) A very useful and comprehensive summary.

Collodion as a substitute for albumen in positive printing. (W. E. Woodbury. *Phot.* iii., 549-551, 562-563 and 579-580.)

II.—DEVELOPMENT PROCESSES.

Bromide Paper gives good results with the following developer:—Eikonogen, 4 grs.; sodium sulphite, 16 grs.; lithium carbonate, 2 grs.; water, 1 oz. (A Cowan, *Photo. N.* xxxv., 194.)

Bromide prints may be developed with eikonogen with very good results, and it has less tendency to give heavy shadows than ferrous oxalate. The whites may be kept clear by reducing the proportion of alkali, or by adding bromide; as a rule, the first method is preferable with dense negatives, and the second with thin ones. A saturated or half-saturated aqueous solution of eikonogen without any addition at all gives very good results, but acts very slowly. With thin negatives the best results are got by adding to the 100

parts of eikonogen solution—eikonogen, 3 parts; sodium sulphite, 10 parts; water, 100 parts; 10 parts of a ten per cent. solution of soda crystals; and to each ounce of this solution 10 minims of a ten per cent solution of potassium bromide. Development will be very slow. Quinol added to the eikonogen developer is of little service, but a small quantity of eikonogen in the quinol developer gives greater detail and softness. (W. K. Burton, *Phot.* iii., 114-116.)

Paramidophenol with bromide paper gives clear whites and good half-tones; the colour of the images varies from grey to brilliant black. (T. J. Bray, *Phot. T.* xxi., 659.)

Paramidophenol is an excellent developer for bromide paper, and gives results superior to those obtained with ferrous oxalate. Andresen's formula with potassium carbonate, diluted with water, or Andresen's concentrated solution, diluted with about fifty times as much water, give excellent results. They act very rapidly, and stronger solutions are not necessary. (F. Stolze, *Phot. Nach.* iii., 690-694.)

Sepia Tones on Gelatino-bromide Paper.—(A) Potassium oxalate 330 parts, water 1,000 parts; (B) potassium chloride 120 parts, water 1,000 parts; (C) ferrous sulphate 24 parts, citric acid 2 parts, potassium bromide 2 parts, water 500 parts. For use mix A 20 parts, B 5 parts, C 5 parts. The colour of the image is warmer the greater the proportion of B used. (*Phot. A.* xxxii., 367.)

Bromide and Alpha prints can readily be toned with platinum. The print, after fixing and thorough washing, is placed in the Platinotype Co.'s platinum intensifier, diluted with from 1 to 3 times its bulk of water. (J. Hodges, *A. Phot.* xiv., 43.)

Toning Bromide Prints.—R. Talbot (*Phot. Neuheiten*) gives the following toning bath for bromide prints:—(A) Potassium ferricyanide 1 part, water 100 parts; (B) uranium nitrate 1 part, water 100 parts. Immediately before use mix A and B in equal volumes. When the desired colour is obtained, wash thoroughly and fix in hypo 2 parts, water 10 parts. This gives a red image; to obtain a brown image place the print as soon as it has acquired a brown colour in a weak alum solution. Then rinse, fix, and wash.

Bromide prints can be satisfactorily toned with uranium ferricyanide, and a considerable range of colour up to deep red can be obtained. Very dilute quinol solution will give a brown image by development alone, but longer exposures are required. This colour of image seems to give the best results when toned; the developer recommended is (A) quinol 180 grs., sodium sulphite 2 oz., potassium bromide 30 grs., water 20 oz.; (B) caustic soda 100 grs., water 20 oz. Take one part of each, and 4 parts of water. Wash very thoroughly after fixing. If desired the print may be passed through a weak solution of hydrogen peroxide and again washed. The toning solution is as follows:—Water 8 oz., glacial acetic acid 90 minims, potassium ferricyanide 4 grains, uranium nitrate 4 grs. It acts somewhat rapidly. Prolonged washing of prints after toning slightly reduces the intensity, the reduction being greater the further the toning has been carried. If toning is prolonged after the red stage is reached, washing for about twelve hours will remove almost the whole of the image. (Weir Brown, *Phot.* iii., 311-312. *B. J. Phot.* xxxviii., 309-310.)

Fading of Bromide Prints.—Platinum and bromide prints, made in England, and washed with great care, were afterwards taken out to India. Some were mounted on card and others were mounted in a book. About a year afterwards it was found that where a bromide print faced a platinum print the former had faded or turned brown, this fading only taking place where the silver of the bromide print was in actual contact with the platinum of the platinotypes. The bromide prints that had been mounted on cards had not altered in the least. (Brown Slick, *A. Phot.* xiv., 130 from *J. Phot. S.I.*)

Feer-type.—Bothamley has made experiments with a solution containing equivalent quantities of sodium diazo-pseudo-cumidine sulphonate, β-naphthol, and caustic soda. Paper immersed in this solution and dried is very sensitive to light, exposure to weak March sunlight for 10 seconds giving a deep pink colour, whilst exposure for one minute gave a deep red, which was not made much darker by another minute's exposure. The rate of change becomes much slower as exposure continues, doubtless because the colouring matter formed at the surface acts as a protecting screen to the unaltered compound behind. A print can easily be obtained with magnesium ribbon, and exposure for 20 minutes to the flame of a No. 5 gas burner, at a distance of six inches, gave an appreciable quantity of colouring matter. "Nature prints" with fern leaves showed a considerable amount of detail and structure. (*J.S.C.I.* x., 523; *Phot. N.* xxxv., 530-531; *B.J. Phot.* xxxviii., 455-456; compare *Annual* i., 98.)

Iron Processes.—Blue Prints can be obtained on albumenised paper. Prepare two solutions: (A) ferric ammonium citrate 15 parts, distilled water 96 parts; (B) potassium ferricyanide 10 parts, distilled water 64 parts. Mix in equal volumes immediately before use, float the paper 30 seconds and dry. The prepared paper will not keep. (*Phot. Nach.* iii., 298, from *Sci. Amer.*)

Oxalic acid materially increases the sensitiveness of cyanotype paper, especially in cloudy weather. Convenient formulæ are (A) ferric-ammonium citrate 120 grs., water 1 oz., with a few drops of strong ammonia solution; (B) potassium ferricyanide 105 grs., water 1 oz. Mix in equal volumes and add to 100 parts 20 parts of a saturated solution of oxalic acid. (F. H. Latimer, *Phot. N.* xxxv., 472; *A. Phot.*, xiii., 441, from *Eng. News.*)

Utilisation of Worthless Negatives.—The negative (after removal of varnish if necessary) is immersed for several minutes in a 10 per cent. solution of potassium ferricyanide, and afterwards, without washing, in a solution of 1 part of hypo (sodium thiosulphate) in 16 parts of water. If the image does not completely disappear this treatment is repeated. The plate is then very thoroughly washed, immersed in a solution of 8 parts potassium ferricyanide and 10 parts ammonium ferric citrate in 100 parts of water, and used for the production of blue diapositives. (*Phot. W.* xvii., 204-205, from *R. Phot.*)

New Iron Printing Process.—Float paper on water 600 parts, ferric chloride (perchloride of iron) 15 parts, citric acid 15 parts. Allow to dry spontaneously in the dark and expose behind a negative until the image is visible. Place in a solution of gelatine mixed with Indian ink or other pigment; the coloured gelatine adheres only to those parts that have been

acted on by light. When sufficiently developed the print is washed in cold water. (*W. Phot. M.* xxviii., 28, from *Boll. Am. Fot. Roma.*)

Prints with Black Lines on a White Ground.—Coat paper by means of a sponge or a brush with this solution:—Water 400 parts, gelatine 10 parts, ferric chloride (percbloride of iron) 22 parts, tartaric acid 10 parts, zinc sulphate 10 parts. Expose behind a transparent positive until the yellow colour of the ground is almost white and immerse in gallic acid 10 parts, alcohol 200 parts, water 1,000 parts If under-exposed the whites will be discoloured, if over-exposed the lines will be grey instead of black. (E. Goolds, *W. Phot. M.* xxviii., 167.)

Kallitype.—Bothamley (*J.S.C.I.* x., 524; *Phot. N.* xxxv., 516-517 and 530-531; *B.J. Phot.* xxxviii, 455-456) has experimented with kallitype (*Annual* i., 100), and confirms the statements of the inventor, but recommends a developer containing only 1 per cent. of silver nitrate, and was not able to obtain any marked alterations in the colour of the image by using different developers.

Kallitype No. 2, in which the silver is on the paper instead of in the developer, was found to give satisfactory results. Whilst potassium dichromate is of very great value in keeping the whites clear, too large a proportion destroys the details and half-tones. The sepia developer gives somewhat uncertain results, but frequently the colour of the image is good. Keeping the paper dry seems to be a point of considerable importance.

The black image in both processes consists of metallic silver, and can be bleached and re-developed, or intensified. It is not appreciably affected by exposure for 48 hours to the products of combustion of sulphur in air, nor by immersion in a solution of sulphurous acid for the same period. A dilute solution of sulphuretted hydrogen slightly alters the colour of the image, but produces no further change; a strong solution changes the colour of the image to brown. A dilute solution of ammonium sulphide changes the colour of the image to a not unpleasant brown, without any loss of detail and with very slight reduction of intensity. The sepia image is unaffected by the products of combustion of sulphur, but sulphuretted hydrogen or ammonium sulphide changes the colour to black and afterwards to brown. There is no reason to doubt the permanence of kallitype prints under all ordinary conditions.

Platinotype.—In cold bath platinotype, the sensitive iron salt with which the paper is coated is usually mixed with a trace of a mercuric salt. The normal developer contains in 100 parts—Potassium oxalate 10 parts, di-potassium ortho-phosphate 4 parts, potassium chloro-platinite 1½ to 2 parts. Both the quantities and proportions of these ingredients may be varied, and the variations affect the quality of the print.

The cold bath process may be used for printing on wood. The wood is sensitised without any previous sizing, and is exposed with the aid of an actinometer. It is then developed by floating it face downwards on the solution, treated twice with a two per cent. solution of citric or oxalic acid in place of hydrochloric acid, then with a 2½ per cent solution of acid sodium sulphite and washed. Chestnut is the best wood for the purpose. (W. Willis, *Phot. J.* xv., 123-127.)

With hot bath platinotype, with a strong developer, a low temperature gives a slightly shorter range of gradation than a hot developer, the scale is weaker in all parts except the deepest shadows, and the deposit is somewhat granular. The cold developer gives a stronger differentiation of the tints at the shadow end. With a weak bath at high and low temperatures, the low temperature bath gives a slightly shorter scale, and the lower half tones are more strongly differentiated. A strong bath and a weak bath at a low temperature gives scales of about the same length, but with the stronger solution the colour is colder and the deposit slightly more granular. In nearly every case a cold bath tends to give a shorter scale than a hot bath, and therefore necessitates a somewhat longer exposure. (Willis, *ibid.*)

Further experiments show the effect of various modes of cold development of the hot bath paper. Normal oxalate solution contains 1lb. of potassium oxalate dissolved in 54 oz. of water; strong D solution contains 1lb. of the mixed oxalate and phosphate in 54 oz. of water; normal D solution contains ½lb. of the mixed salts in 50 oz. of water. At 60° the normal oxalate gives quicker development and stronger middle tones than either of the D solutions; the normal D gives a slightly shorter scale than the strong D. Acidification of the normal oxalate with oxalic acid makes development much slower, and the image is weaker in the shadows and the middle tones. Acidification of the strong D gives a slightly weaker image. Acidification of the normal D solution has no effect on the strength of the shadows, but shortens the scale, and hence is a good plan to adopt in the case of very weak and flat negatives. Prints must he much deeper for cold development than for hot, and the progress of development must be watched and arrested at the right moment. A difference of a few degrees in temperature very distinctly affects the results. (Willis, *Cam.C.J.* v., 120-121.)

Old Platinotype Paper.—Platinotype paper that had become damp, and with the ordinary developer gave fogged prints, gave very satisfactory prints, with clear whites, when potassium hypochlorite was added to the developer. The quantity of hypochlorite necessary must be ascertained by trial. (W. K. Burton, *B. J. Phot.* xxxviii., 389-390.) Sodium hypo-bromite gives similar results. With fresh paper the hypo-bromite gives hard images. (*Ibid* 421-422.)

Clearing Prints.—Platinum prints may be cleared with a solution of copper sulphate (1 part in 100) instead of hydrochloric acid. (A. Huszar, *Der Amat. Phot.* v., 74-75.)

Brown Platinotypes.—With the hot bath process, the addition of 10¼ per cent. of a solution of mercuric chloride (5 in 100) to the sensitising bath gives blackish-brown prints with pure whites; 2½ per cent. of crystallised mercuric chloride to the developing solution gives sepia prints with yellow lights, 5 per cent. of the mercuric chloride solution (5 in 100) added to the sensitising solution and 2 per cent. of the crystallised salt to the developer gives brilliant prints of a yellowish-brown tone, the higher lights being white and the half-tones yellowish. With the cold bath process, 10 per cent. of the mercuric chloride solution (5 in 100) to the sensitising solution gives prints with transparent shadows; 2 per cent. of crystallised mercuric chloride to the cold developer precipitates metallic platinum. All developers to which mercuric chloride is added can be used only once. In the direct printing

process a large proportion of mercuric chloride and a small proportion of potassium chloro-platinite gives light brown prints; with reversed proportions the prints are dark brown, the limits being 4·12 per cent. of crystallised potassium chloro-platinite (K_2PtCl_4) and 5·05 per cent. of crystallised mercuric chloride A few drops of a solution of ferrous chloride added to the sensitising solution increases the brilliancy of the prints. (R T. Sachers, *Phot. T.* xxi., 489.)

Carbon process. B. Meyer. (*Phot. Nach.* iii., 641-648.)

Zinc etching experiences. By A. H. Calderwood. (*W. Phot. M.* xxviii., 334-335, 396-398.)

Primuline Process.—Transparencies on glass and positives on celluloid and opal can be obtained by means of a film of the following composition: Primuline 80 grs., gelatine 1 oz, chrome alum 2 grs, distilled water 20 oz. (J. Carbutt, *Phot. T.* xxi., 31.)

Primuline Process.—Bothamley has made a number of experiments with this process, and in general confirms the statements of the inventors (*Annual* i., 98-99). He finds β-naphthol, resorcinol, phenol, α-naphthylamine, metaphenylenediamine, and eikonogen to be the most satisfactory developers. The disagreeable smell of naphthylamine can be removed from the fingers, etc., by dipping them in dilute nitrous acid (*e.g.*, the solution used for diazotising the primuline). Phenol at first gives a deep orange image, but on washing this changes to yellow, and it is necessary to continue the washing until the change is complete, which takes a somewhat long time. Quinol gives a pale yellow image, and is of no practical value as a developer in this process. Developing solutions containing 2½ parts of the active constituent per 1,000, as recommended by the inventors, act quite as well as the stronger solutions recommended in *B J. Phot.* (*loc. cit.*) Pyrogallol is troublesome to use, since it becomes very dark coloured at the surface, and the fabric is liable to be stained. Eikonogen develops a blue image, as stated by the inventors, and not a black image, as stated in *B.J. Phot.* In order to apply the process to paper the paper should be sized with a hot solution containing two per cent. of gelatine and a small quantity of chrome alum and dried. It is then *floated* on a hot solution of primuline, care being taken that none gets on the back, and again dried. When wanted it is diazotised and treated in the same way as a fabric. To apply the process to glass, carefully cleaned plates are coated with a warm solution of gelatine 50 parts, primuline 20 parts, water 1,000 parts, chrome alum ¼ to 1 part. When set, the film is diazotised, well washed, and dried. As much chrome alum should be added to the gelatine solution as can be used without precipitating the gelatine (*J.S.C.I.* x., 523; *Phot. N.* xxxv., 531; *B. J. Phot.* xxxviii., 455-456).

Uranium Prints.—Paper is floated for two minutes on uranium nitrate 127 parts, copper nitrate 38 parts, distilled water 1,000 parts, and dried. In making the solution the salts should be dissolved in a small quantity of water, neutralised with ammonia and diluted. Expose behind a negative 8 or 12 minutes, and develop the feebly visible image with a 2 to 3 per cent. solution of potassium ferrocyanide. The colour of the image is sepia brown. Another method is to float paper, previously well sized with arrowroot or gelatine, on a solution of uranium nitrate 72 parts, copper nitrate 20 parts, distilled water

1,000 parts, neutralised with sodium carbonate. The easily visible image is developed with an 8 per cent. solution of potassium ferricyanide; the image is blood red. (*Phot. Nach.* iii., 556-557: *Der Amat. Phot.* v, 151-152.)

TRANSPARENCIES AND LANTERN SLIDES.

Diapositives and Reproduced Negatives can be obtained by means of Christensen's collodio-chloride paper. The print is first obtained in the usual way by printing in sunlight, or diffused light, according to the character of the negative. Very hard negatives must first be reduced. A deep print is necessary, and it is first washed, then toned in a solution of ammonium sulphocyanide 10 parts, gold chloride solution (1 in 100) 40 parts, water 1,000 parts, fixed without washing in a 5 per cent. solution of hypo, and washed for a short time. Thoroughly-cleaned glass plates are prepared by pouring over one of the surfaces a solution of 35 parts of gelatine and 2 parts of alum in 1,000 parts of water, which is allowed to drain off, and the plates are dried in a place free from dust. The collodio-chloride print is placed face downwards in a dish at least twice the area of the print, and boiling water is poured on the back of the print until the paper is completely detached from the collodion. The paper is removed, taking care not to disturb the barium sulphate that is on the back of the film. When the water in the dish is quite cold (cold water previously boiled may be poured in to displace the hot water), one of the prepared plates is placed with the prepared surface uppermost in the dish alongside the print, and by means of a camel's-hair brush the latter is carefully moved on to the glass plate, any air bubbles being carefully removed by means of the brush after the plate has been lifted out of the dish. Excess of water is drained off, and the plate is allowed to dry in a horizontal position. When dry the barium sulphate on the film may be completely removed by carefully rubbing with wet cotton wool. The print will, of course, be reversed, but this may be avoided by means of double transfer with the help of gummed paper. The film may also be transferred to a thin sheet of gelatine, and then can be printed from either side if it is required for the production of negatives. (A Miethe, *Phot. W.* xvii., 225-227.)

Paramidophenol solution gives very good results for lantern slides. It may be used over and over again. (*Phot. T.* xxi., 521-522.)

L. Macdona has suggested a print-out albumen process for lantern slides, the albumen being mixed with sodium-chloride and citrate, and sensitised after coating and drying with a solution of silver nitrate containing citric acid. (*Phot.* iii., 376.)

Developer for Diapositives.—A. Quinol 9 parts, eikonogen 9 parts, potassium metabisulphite 9 parts, water 700 parts; B Potassium carbonate 45 parts, sodium carbonate 45 parts, potassium ferrocyanide 45 parts, water 700 parts. Mix A 8 parts, B 1 part, water 8 parts. (J. Colgrave, *Phot. W.*, xvii., 134.)

Lantern slides can be made by drawing with a pencil on glass coated with ether 100 parts, sandarac 2 parts, mastic 2 parts, benzene 20 parts.

After the drawing is made it is coated with ether 100 parts, sandarac 3 parts, mastic 3 parts, and becomes perfectly transparent. (Caufyn, *B. J. Phot.* xxxviii., 282-283.)

The albumen process for lantern slides. (A. Pringle, *Phot. T.* xxi., 401-403 *et seq.*)

Collodion for lantern work. (F. P. Perkins, *Phot.* iii., 514-515.

Colouring lantern slides. (*Phot. T.* xxi., 317-319.)

ENLARGEMENTS AND COPYING.

Enlargements of beautiful quality can be obtained by first making an enlarged transparency, somewhat thin and very full of detail, on a rapid celloidin film, and printing a negative from this on a sheet of albumenised or other paper, which is afterwards waxed, or on a glass plate or transparent film coated with gelatino-citro-chloride, etc. (Abney, *Phot.* iii., 849-850.)

Enlargements on Platinum Paper may easily be obtained by means of a condenser and sunlight, or the electric arc light. In the latter case a second condenser should be placed between the arc and the first condenser so that a parallel beam of light may be thrown upon the latter. (Abney, *Phot.* iii., 703-704.)

Copying Line Engravings.—Carbutt recommends (*Phot. T.* xxi., 488-489) development with pyro and sodium carbonate, well restrained with bromide. The lines may be cleared by means of iodine and potassium cyanide and the image intensified, if necessary, with mercuric chloride followed by silver cyanide.

The exposures should be as short as possible, and the lens should be carefully shaded, preferably with a cone lined with black velvet. Wet collodion sensitised with zinc bromide and iodide and developed with ferrous sulphate mixed with glucose and acetic and tartaric acids gives the best results. (Water 480 parts, ferrous sulphate 25 parts, liquid glucose 15 parts, tartaric acid 3 parts, acetic acid 8° 15 parts, alcohol, *quant. suff.*) Gelatino-bromide plates should be developed with pyro-soda restrained with bromide, and intensified, if necessary, with mercuric chloride, followed by ammonia or, better, hypo solution nearly saturated with silver carbonate or chloride. In many cases it is advisable to use backed plates. (P. C. Duchochois, *Phot. T* xxi., 498-500.)

Exposures should be short, and slow plates quite free from fog should be used. Old quinol developer gives good results. (C. Ehrmann, *Phot. T.* xxi., 500-501.)

Fluorescence or phosphorescence of paper or card-board sometimes exerts great influence on the photographic copying of plans, etc.; any fluorescence increases the opacity of the white surface in the negative. In other cases, *e.g.*, ribbons, fluorescence has a similar effect. (Abney, *Phot.* iii., 786-787.)

ORTHOCHROMATIC METHODS.

History of Orthochromatic Photography.—(Vogel, *Phot. Mitt.* xxvii., 325-329. *Phot. Corr.* xviii., 54-56. Eder, *Phot. Corr.* xviii., 75-77.)

Vogel (*Phot. Corr.* xviii., 551-555) gives a concise account of the discovery of orthochromatic photography, and of the development of photographic

reproduction in natural colours. He states that Ulrich and E. Vogel have worked out a practical and satisfactory colour-printing process on the basis that he laid down in 1885. (See *Wied. Ann.*, xxvii., 130, and *Phot. N.*, xxxi., 568).

Estimation of colour-sensitiveness by means of a photographic spectrum apparatus. (V. Schumann, *Phot. R.* v., 203-209, 311-319, 348-365.)

H. W. Vogel replies at length (*Phot. Mitt.* xxviii., 23-28) to Schumann's criticism of his method of estimating the relative sensitiveness of orthochromatic plates to yellow and blue.

Relation between absorption and sensitiveness of photographic plates. (J. J. Acworth, *Wied Ann.*, xlii., 371-406.)

Sensitisers.—Experiments on the relation between the chemical constitution of the eosin dyes, their sensitiveness to light, and the sensitising effect on photographic plates, lead to the following results:—(1) All dyes of the eosin group have a sensitising action. (2) The silver salts have a greater effect than the ordinary alkaline salts, the effect extending further towards the red end, and the relative sensitiveness to blue and violet being lower. (3) Derivatives in which a halogen is substituted in the resorcinol residue are better sensitisers than derivatives in which the substitution takes place in the phthalic residue. (4) Derivatives in which substitution has taken place in the resorcinol residue only are better sensitisers than those in which substitution has been effected in both residues. (5) Iodine derivatives are better sensitisers than bromine derivatives, the best being erythrosin (tetraiodofluorescein) and diodofluorescein. (6) The sensitising effect is greater, the more sensitive the dye is to light. (7) The sensitising action increases as the fluorescing power decreases. Dilute solutions of erythrosin were mixed with caustic soda, hydrogen peroxide, caustic soda, and hydroxylamine hydrochloride respectively. Some of each mixture was kept in the dark, and in all cases remained unaltered; some was exposed to light, and showed very little change, except in the case of the solution containing hydroxylamine. In the latter the erythrosin was completely reduced to fluorescein. Precisely similar behaviour was shown by all the eosin dyes, and hence it is concluded that the fading of these dyes, when exposed to light, is a process of photochemical reduction. (E. Vogel, *Phot. Mitt.* xxviii., 140-141, 153-155, 168-171.)

Cyanin.—Ordinary cyanin is iodo-cyanin, and when used as a sensitiser for orange and red, has a great tendency to produce fog. It is converted into chloro-cyanin by heating on a water bath with dilute hydrochloric acid, the liquid being finally evaporated to dryness, and the residue gently heated to expel the last traces of acid. The product is dissolved in alcohol. As shown some years ago it sensitises for orange and red as well as does iodocyanin, and has the advantage of a much smaller tendency to produce fog. (Eder, *Phot. Corr.* xviii., 313-314.)

Rhodamine.—Free silver nitrate is apparently without influence on the sensitising action of rhodamine for the less refrangible rays. (*A. Phot.* xiii., 390.)

Sensitisers for Red.—Higgs states (*Proc. R. S.* xlix., 345-346) that an ammoniacal solution of one part of cyanine in 30,000 parts of dilute alcohol reduces the general sensitiveness of gelatino-bromide plates to one-fourth,

and this result is not affected by quinine. Alizarin blue S. confers on gelatino-bromide plates a high degree of sensitiveness to rays between wave length 6,200 and wave length 8,000, but does not reduce the sensitiveness to blue and violet. In order to obtain the best results the dye should be carefully purified. Alizarin blue paste is triturated with a saturated solution of acid sodium sulphite, and transferred to a stoppered cylinder containing a further quantity of acid sulphite solution. The mixture is allowed to remain five or six weeks, with daily agitation, but is left at rest for the last eight or ten days. The liquid is decanted off, filtered, and the sulphite precipitated with alcohol. Now add 50 parts of water and a large quantity of common salt, and set aside in an open jar for seven or eight days. The dye crystallises out together with calcium sulphite, but the latter is removed, together with unaltered alizarin blue, by dissolving in water and filtering. The final purification is affected by crystallisation from strong alcohol. A solution of one part of the purified dye in 10,000 parts of water containing one per cent. of ammonia gives excellent results if the prepared plates are used at once; the sensitiveness extends as far as wave length 8,400, and the detail is remarkable. Cœrulein S. prepared in a similar way gives almost identical results.

Yellow Screen.—In order to avoid the use of a yellow screen in orthochromatic photography, Vidal recommends immersion of the plate in a solution of ammonium picrate (picric acid neutralised with ammonia), and states that this treatment results in a considerable reduction of the sensitiveness to blue and violet. (*B. S. F. Phot.* [2] vii., 163-165.)

Orthochromatic Collodion Emulsion, according to A. Jonas (*Phot. Corr.* xviii., 318-329), may be prepared as follows:—(1) Ammonium bromide 64 parts, distilled water 80 parts, absolute alcohol 800 parts, thick collodion (4 per cent.) 1,500 part, acetic acid 65 parts. The bromide is dissolved in the water, and the alcohol, collodion and acid added in this order. (2) Silver nitrate 80 parts, distilled water 50 parts. The silver salt is dissolved at a gentle heat, and aqueous ammonia is then added, until the brown precipitate is just re-dissolved, 800 parts of alcohol, previously heated to 45° C., is then added. In orange light No. 2 is added gradually to No. 1 with vigorous agitation, the temperature of 2 being kept at 40-50° C. A drop is then mixed with water and tested with litmus, and if still alkaline, acetic acid must be added gradually until the reaction is acid. The mixture is vigorously shaken for fifteen minutes, allowed to stand for about an hour, and then poured into five or six times the quantity of water. The precipitated emulsion is collected in a clean cloth, washed for one or two hours in running water, washed finally with distilled water, squeezed, and dried on pure filter paper. Complete drying requires from one to two days, and the dry emulsion must be kept in the dark. For use, 6 parts of the dry collodio-bromide is dissolved in 40 parts of alcohol and 60 parts of ether. The purity of the alcohol and ether is of great importance.

In order to sensitise the emulsion for green, yellow, or orange, it is mixed with a very small quantity of ammonio silver nitrate, an equivalent quantity of one of the dyes of the eosin group and a certain quantity of ammonium picrate. Cyanin may also be used with, or in place of the eosins, a mixture of cyanin and erythrosin giving good results; whilst a mixture of cyanin and eosin is not satisfactory. An excess of ammonio-silver nitrate greatly increases the

sensitiveness, and with an excess of 58 milligrams of silver nitrate per 100 c c. of emulsion there is very slight fog. With an excess of fifty milligrams of silver nitrate per 100 c.c. of emulsion there is no fog, and the sensitiveness is twice as great as with eosin silver alone. A spectroscopic experiment shows that eosin and erythrosin give much more satisfactory results than phloxin or rose-bengal, and the following formulæ are recommended: (A) *Eosin solution*: Crystallised eosin 4 parts, distilled water 50 parts, alcohol (96 per cent.) 450 parts. (B) *Silver solution*: Silver nitrate 3 4 parts, distilled water 50 parts, concentrated ammonia to this solution until the brown precipitate is re-dissolved, and then 96 per cent. alcohol up to 300 parts. (C) *Ammonium picrate solution*: Picric acid 3 parts, water 10 parts, neutralise exactly with ammonia, and add 96 per cent. alcohol up to 300 parts. D) *Erythrosin solution*: Pure erythrosin 4 parts, distilled water 50 parts, alcohol (96 per cent.) 450 parts.

For eosin silver, mix A 75 parts, B 30 parts, C 30 parts, pure glycerine 20 parts, alcohol (96 per cent.) 45 parts, allow to stand one to two days, filter, and add 2 parts to 10 parts of the plain emulsion.

For erythrosin silver, mix D 75 parts, B 30 parts, C 30 parts, pure glycerine 20 parts, alcohol (96 per cent.) 120 parts, distilled water 20 parts. The turbid liquid is allowed to stand 15 minutes, then carefully mixed with ammonia, drop by drop, until it becomes completely clear, allowed to stand one to two days in a well-closed bottle, filtered, and two parts added to ten par s of the plain emulsion.

After addition of the sensitiser the emulsion is vigorously shaken, filtered twice through cotton wool, and used; it cannot be kept more than two days, and is best used at once. Erythrosin silver tends to give stronger contrasts than eosin silver. The exposure required is about one-third of that necessary for ordinary wet collodion.

Eosin silver and erythrosin silver solutions may be kept for a long time, provided that they are carefully protected from light.

Before being coated the clean glass plates should be flowed over twice with a solution of gelatine 5 parts, water 500 parts, acetic acid 15 parts, and alcohol 10 parts, and allowed to dry in a warm place. Coating and other operations are conducted in a ruby light. As soon as the alcohol and ether have evaporated, the moist plate is exposed; in an ordinary room the plate will remain sufficiently moist for 30 to 40 minutes. After exposure the film is washed with water until all greasiness disappears, allowed to drain thoroughly, and flowed over with the developer. (A) Distilled water 500 parts, sodium sulphite 200 parts, pure potassium carbonate 200 parts. (B) Quinol 25 parts, alcohol (96 per cent.) 100 parts. (C) Ammonium bromide 25 parts, distilled water 100 parts. For the concentrated developer mix A 100 parts, B 5 parts, C 7 parts, or if stronger contrasts are needed, B 6 to 10 parts, and for actual use dilute 150 parts of this mixture with 1,000 parts of water. The negatives are fixed in hypo, and may be intensified before fixing with pyro, citric acid, and silver nitrate, or after fixing with Hübl's quinol silver intensifier. If necessary, mercurial intensification with sulphite may be used. Reduction is effected with hypo and ferricyanide, or by treatment with dilute potassium permanganate solution, followed by potassium cyanide solution.

Orthochromatic Dry Collodion Plates (Gaedicke's) require twice the exposure necessary for gelatine plates of medium sensitiveness treated with the erythrosin bath. When exposed to the spectrum of sunlight the maximum sensitiveness is very near D; the sensitiveness to violet is very low, and the minimum of sensitiveness between E and F shown by gelatine plates treated with the erythrosin bath is, with these collodion plates, almost indistinguishable. The sensitiveness to violet is so small that a yellow screen is unnecessary even for landscape exposures. (R. Neuhauss, *Phot. W.* xvii., 355-356.)

Gaedicke's orthochromatic dry collodion plates may be developed with the following solution:—(A) Quinol 66 parts, sodium sulphite 23 parts, potassium ferrocyanide 166 parts, water 3,700 parts. (B) Caustic potash 330 parts, water 3,700 parts. Mix 30 parts of A with 5 parts of B and 30 parts of water. The rendering of colours is practically the same as with an erythrosin bath plate, chrome yellow being somewhat stronger. The plates become partially opaque when dried, but regain their transparency on varnishing. The grain is minute and regular. (A. Miethe, *Phot. W.* xvii., 201-202 and 209-211.)

PHOTOGRAPHY IN COLOURS.

Veress states that he has been able to shorten very considerably the time necessary for the production of heliochromic prints. Liesegang states that the images are on paper coated with collodion emulsion, and that red and blue are well shown, and green partially (*Phot. A.* xxxii., 135-136).

Heliochromy.—Lippmann has attacked this problem in a new manner with considerable success (*Compt. Rend.* cxii., 274-275). A grainless sensitive plate is so arranged that it forms one side of a small trough that is filled with mercury, the sensitive film being inside, so that it is in contact with the mercury. A spectrum is allowed to fall on the sensitive film through the glass, and after a sufficient exposure the plate is developed. In order that sufficient exposure may be given to the red end of the spectrum without reversing or over-exposing the blue, it is necessary to employ coloured screens. Under the conditions indicated the light that passes through the highly translucent film is reflected back through the film from the surface of the mercury, and if the angle of incidence is properly adjusted the reflected wave will not coincide in phase with the incident wave, and more or less complete interference will take place with production of a succession of maxima and minima of light intensity in the film. The reduction and deposition of silver will take place only at the position of the maxima, and hence the metal will be deposited in a series of layers. Since the interval between successive layers will be equal to half the wave length of the light that has produced them, they will when viewed by reflected light reflect rays of the same colour. This holds good for rays of any wave length, and hence if the exposure for each part of the spectrum has been properly timed a coloured reproduction of the spectrum will be obtained. The method is based on the hypothesis as to the nature of heliochromic reproductions propounded several years ago by Zenker, and later, though independently, by Lord

Rayleigh (*Phil. Mag.* 1879), and on the principle of "stationary waves" established by Wiener. Lippmann uses (1) ordinary albumen plates with thick film; (2) Taupenot plates with a double or triple layer of albumen; (3) gelatine plates obtained by coating glass plates with a solution of 20 parts of gelatine and 1 part of potassium bromide in 200 parts of water, and after drying, sensitising them by immersion for five minutes in a 20 per cent. solution of silver nitrate acidified with acetic acid. The plates are developed with pyrogallol and ammonium carbonate in the same way as Taupenot plates. (See also *Phot. N.* xxxv., 160, 189, 198, 199; *B. Belge Phot.* [2] viii, 124-132, 245-254; *B. S. F. Phot.* [2] vii., 74-77; *Phot. Nach.* iii., 740-744.)

C. B. Thiving (*Amer. J. Sc.* [3] xlii., 388-390) employs collodio-bromide on a thin substratum of albumen. Twenty-five parts of cadmium bromide is dissolved in 280 parts of alcohol and acidified with five parts of hydrochloric acid Five parts of this solution is mixed with 40 parts of ether and two parts of pyroxyline, and to the mixture one part of silver nitrate dissolved in ten parts of alcohol is added drop by drop. The emulsion is poured out without waiting for it to ripen. The film shows a pale opalescent blue colour. When exposed in contact with mercury behind strips of coloured glass (red, orange, green, blue, purple) the results indicate that mixed colours can be reproduced with a fair degree of accuracy. The thickening of the film between exposure and the final drying occasionally changes all the colours in the direction of the red end of the spectrum. In order to obtain a distinct representation of the red, the blue is greatly over-exposed. Over-exposure produces reversal; the colours of the original are seen at the back of the film, whilst the face of the film shows the complementary colours.

H. W. Vogel points out that the colours obtained by heliochromic methods involving the use of silver salts do not correspond in tint or position with the colours of the original. He considers that in consequence of the reflection and dispersion of light in the film the colours cannot be obtained pure, hence the images will never show truly natural colours (*Phot. Mitt.* xxviii., 205-207).

Vogel republishes (*Phot. Mitt.* xxviii., 226-228) his proposed method for an improved process of photographic reproduction in natural colours which was first published in 1885.

Absorption and Photography of Colours. By Labatut (*Compt. Rend.* cxiii., 126-129).

PHOTO-ELECTRICITY.

Photo-electricity.—Minchin (*Phil. Mag.* [5] xxxi., 207-238, and *Cam. C. J.* v, 89-93, *Phot. N.* xxxv., 59-61 and 72) has made a large number of experiments on the production of electric currents by the impact of light on metallic plates with or without a superficial coating of oxide or salt, and immersed in some conducting fluid. No general laws are deduced. The direction and intensity of the current depends on the nature of the metal, the nature of the film on its surface, and the nature of the liquid in which the plates are immersed. With silver bromide or chloride emulsified in collodion, spread on the surface of silver plates, and immersed in a very dilute solution of potassium bromide or sodium chloride, as the case may be, the plate exposed to the action of light is negative to the protected or unexposed plate. With films of silver

iodide on silver immersed in a dilute solution of potassium iodide, or silver sulphide on silver in a very dilute solution of potassium sulphate, the exposed plate is positive to the other. Eosin in gelatine on a silver plate becomes negative to the unexposed plate. As a rule a much greater photo-electric effect is produced by the more refrangible rays than by the less refrangible, but dark brown films of melted selenium on aluminium plates immersed in acetone are almost equally sensitive to all parts of the prismatic spectrum. Well-marked currents are obtained with plates of tinfoil coated with a film of stannic oxide, but light produces no effect if the plates are immersed in a solution of a chloride. Frequently a cell that is sensitive may be made insensitive by a blow at one end of the cell, whilst its sensitiveness to light is restored by a blow in the opposite direction. It is very noteworthy that a cell that has passed into the insensitive condition is at once made sensitive by the inductive action of a Hertz oscillator even at a distance of 81 feet. An electric current passed between silver plates coated with a collodion emulsion of silver chloride or bromide immersed in a dilute saline solution, causes visible reduction of the silver salt on the positive electrode, whilst that on the negative electrode becomes reducible by a developer, although it has not been exposed to light.

Waterhouse finds (*Phot. N.* xxxv., 219-220, 239, 298-299, and 684-685) that when two plates of silver covered with a film of silver bromide by the action of bromine are connected with the poles of a battery, and immersed in an eikonogen-soda or eikonogen-lithia developer, the plate connected with the positive pole remains clear, whilst that connected with the negative pole gives a deposit of metallic silver. If a small quantity of thiosinnamine is added to the developer, the effect is reversed, and the positive pole shows a deposit, whilst the negative pole remains clear. Similar results were obtained with gelatino-bromide plates and paper. Ferrous oxalate does not give such distinct indications of reversal as eikonogen, and this is true also of its behaviour with photo-images. When an exposed and unexposed plate are connected in circuit with a galvanometer, and immersed in an ordinary eikonogen developer, there is a deflection of the galvanometer needle, but it rapidly returns to its original position. If a small quantity of thiosinnamine is added to the developer, the needle comes back very slowly, and a similar effect is obtained with the compound of thiocarbamide and ammonium bromide. In an ordinary developer the exposed plate is negative to the unexposed, but if the developer contains a small quantity of the compound of thiocarbamide and ammonium bromide, the exposed plate is positive to the other, the thiocarbamide reversing the current just as it reverses the image. With gelatino-bromide plates the currents are much weaker than with bromised silver plates, but they can be observed even with the ferrous oxalate developer if the plate is made conducting by means of a layer of gold leaf.

Further experiments in England (*Phot. J.* xvi., 47-52; *Phot. N.* xxxv., 698-700; *B. J. Phot.* xxxviii., 697-698) give very uncertain results, and, whilst they indicate the existence of currents, leave the exact cause of them very much in doubt. Results as to the reversal of the current by thiocarbamides were also conflicting.

Electric Action of Light (R. Liesegang, *Phot. A.* xxxii., 347-349, 378-382).

ABBREVIATIONS OF THE TITLES OF PERIODICALS.

Amateur Photographer	*A. Phot.*
American Amateur Photographer	*Amer. A. Phot.*
American Annual of Photography	*Amer. Ann. Phot.*
American Journal of Photography	*Amer. J. Phot.*
Anthony's Photographic Bulletin	*A. Phot. B.*
British Journal of Photography	*B. J. Phot.*
British Journal Almanack	*B. J. Phot. A.*
Bulletin de l'Association Belge de Photographie ...	*B. Belge Phot.*
Bulletin de la Société Francais de Photographie ...	*B. S. F. Phot.*
Bulletin de Photo Club de Paris	*B. Phot. C.*
Der Amateur Photograph	*Der. Amat. Phot.*
International Photographic Annual	*I. Phot. A.*
Jahrbuch fur Photographie und Reproductions Technik	*Jb. Phot.*
Journal of the Camera Club	*Cam. C.J.*
Journal of the Photographic Society of Great Britain	*Phot. J.*
Journal of the Photographic Society of India ...	*J. Phot. S.I.*
Moniteur de la Photographie	*Mon. Phot.*
Photographic News	*Phot. N.*
Photographic Times	*Phot. T.*
Photographisches Archiv	*Phot A.*
Photographische Correspondenz	*Phot. C.*
Photographisches Mittheilungen	*Phot. Mitt.*
Photographische Nachrichten	*Phot. Nach.*
Photographische Notizen	*Phot. Not.*
Photographische Rundschau	*Phot. R.*
Photographisches Wochenblatt	*Phot. W.*
Photography	*Phot.*
Photography Annual	*Annual.*
Revue de Photographie	*R. Phot.*
Wilson's Photographic Magazine	*W. Phot. M.*
Year Book of Photography	*Y. B. Phot.*

American Chemical Journal	*Amer. C.J.*
American Journal of Science	*Amer. J. Sc.*
Annalen der Physik und Chemie	*Wied. Ann.*
Annales de Chemie et de Physique	*Ann. Chim. Phys.*
Berichte der Deutschen Chemischen Gesellschaft ...	*Ber.*
Chemical News	*C.N.*
Comptes Rendus des Seances de l'Academie des Sciences	*Compt. Rend.*
Journal of the Chemical Society : Transactions ...	*C.S. Trans.*
Journal of the Chemical Society : Abstracts ...	*C.S. Abs.*
Journal of the Royal Institution	*J.R.I.*
Journal of the Society of Chemical Industry ...	*J.S.C.I.*
Liebig's Annalen der Chemie und Pharmacie ...	*Annalen.*
Nature	*Nat.*
Pharmaceutical Journal	*Pharm. J.*
Philosophical Magazine	*Phil. Mag.*
Philosophical Transactions of the Royal Society ...	*Phil. Trans.*
Proceedings of the Royal Society	*Proc. R.S.*
Year Book of Pharmacy	*Y.B. Pharm.*
Zeitschrift fur Analytische Chemie	*Zeit. A C.*
Zeitschrift fur Physikalische Chemie	*Zeit. P.C.*

PROGRESS OF ASTRONOMICAL PHOTOGRAPHY DURING 1891.

BY ALBERT TAYLOR, A.R.S.M., A.R.C.Sc., F.R.A.S.

IN a review of this character it is practically impossible to give an account of the whole of the actual advances made during the year, owing to the fact that many astronomers do not publish their results at once, but carefully examine and discuss them, and endeavour, as far as possible, to confirm them before giving them to the world. For the same reason many of the most important papers published during the year are records of work done in previous years. I have endeavoured to collect all the literature published on the subject of astronomical photography, and to obtain a brief account of the practical work performed, and although I can scarcely hope to notice everything published and done, I have endeavoured to give some account of the most important results. I have carefully avoided the introduction of controversial matter as far as possible, and wherever differences of opinion have been mentioned have endeavoured to give a fair statement of the experiments which have led to those differences without discussing the opinions held by the various parties in the controversy. In astronomical photography, as in all new developments of scientific methods of research, there have been some few cases of grave mistakes made by publication of results obtained from hasty examinations of the plates, but although such mistakes may benefit science by calling attention to actual facts, and certainly do enforce the necessity of great care in interpreting the results obtained, I have not considered them of sufficient value or interest for introduction here.

NEBULAR PHOTOGRAPHY.

In last year's ANNUAL (p. 106) it was mentioned that Dr. Common, at Ealing, was not satisfied with the first mirror he made for his five-foot reflecting telescope and that a new one was being made. This was finished in June, 1891, and has been mounted in the telescope. All preliminary testing has shown the new mirror to be an excellent one, and much useful work may be expected from it whenever the fickle English weather will allow long exposure photography. The alterations of the telescope and testing of the new mirror have, necessarily, occupied considerable time, and the nebula photographs obtained have, therefore, been less in number than before. Ten photographs of the Orion nebula have been obtained with exposures varying from 40 minutes to 3 hours 55 minutes. A full discussion of the photographs is not yet published, but an examination of them shows a very considerable

advance on former work, the large size of the picture enabling many details not visible on negatives taken with instruments of shorter focus to be clearly seen. The series of photographs of the Dumb-bell nebula, M. 77 and M. 99, has been continued, and photographs of the Omega nebula (M 17) and of other fainter nebula obtained, which show considerable detail. Orthochromatic plates have been used as well as ordinary plates. The advantage of using plates stained with erythrosin in preference to ordinary photographic plates, which are not sensitive to the green, has been fully established, but work with both kinds of plates will be continued. A comparison of the pictures thus obtained seems likely to indicate differences of chemical constitution in various portions of nebulæ, for any unequal strengthening of particular details by the use of the orthochromatic plates will have its origin in excess of green light. It is thus probable that by photography we may be able not only to explain many differences in the observations of the spectrum of the same nebula by different observers, but also to map out in a nebula particular parts which are of different chemical constitution from the rest.

Mr. Roberts, with the 20 inch reflector, at his new observatory at Crowborough, has made the most of his improved conditions. He has obtained altogether 196 photographs of stars, nebulæ and clusters, with exposures varying from 30 minutes to 4 hours. Many short exposure photographs have also been obtained. Enlargements of the best of his results will be made and presented in due course to the Royal Astronomical Society. The photographs of the great nebula in Andromeda, taken by Mr. Roberts, first showed us the beautiful structure of that nebula, in which we have the central nucleus and the ring structure demanded by Laplace's nebula hypothesis. These valuable negatives have recently added another important fact to our knowledge. From an examination of 12 photographs with exposures varying from 5 minutes to 4 hours, there is direct proof that the nucleus of the great nebula is variable. Some of the photographs show a distinctly stellar nucleus, while on other plates there is no such condensation (*Mon. Not.* R.A S., vol. li., page 116). It will be remembered that in 1885 a new star appeared in this nebula, and after shining for some time as a star of the seventh magnitude faded slowly until it became invisible in all telescopes It is a curious and important fact that we have in this nebula a variable star, and that near it, but not coinciding in position, there appeared one of the new or temporary stars of which only about 18 have appeared in twenty centuries. The necessity for systematic photographic examination of nebulæ is obvious, and the results to be obtained from such work cannot fail to yield important information in the near future.

In 1852, October 11, Mr. Hind discovered a faint nebula in Taurus which has since disappeared. Mr. Burnham, observing in November, 1890, with the Lick telescope, announced the discovery of a small condensed nebula in the neighbourhood of the lost nebula, but Mr. Roberts in a photograph of this region, with 3 hours' exposure, has failed to find any nebulosity or nebulous star. (*Mon. Not. R.A S.*, vol. li., page 440.)

An exceedingly valuable discussion of Mr. Roberts's photographs of the Pleiades (cluster and nebulæ) and its probable connection with the Milky Way appears in *Knowledge* for May, 1891, and is illustrated by a beautiful reproduction of one of the photographs. The marvellous threading of stars on thin

lines of nebulous matter, like beads on a string, is splendidly shown. This is direct proof of the intimate connection of these stars with each other, and that they are at practically the same distance from us. Without photography this important and interesting result would probably never have been discovered. Heinrich Sourtier has a somewhat similar article in *H. und E.*, July, 1891.

Mr. Barnard (*Ast. Nach.* 3018) announced the existence of a new nebula, near the star Merope in the Pleiades, which he had discovered by eye observations at the Lick Observatory, and which was not shown on the photographs by Roberts or by the Brothers Henry, of Paris. He explained the absence of this, the brightest nebula in the Pleiades, from all the photographs, by the fact that the images of the star Merope on the plates always covered the nebula. This serious limit to the photographic study of nebulæ was removed by Professor Pritchard (*Ast. Nach.* 3024), who explained that the photographic image of Merope, on his plates taken with the 13 inch reflector at Oxford, was not so large as to obscure the nebula, and that it was shown on five plates taken since 1889, with exposures varying from 20 to 120 minutes. If the image of Merope on all photographs were really 40″ in diameter, as indicated by Mr. Barnard, then all attempts to make accurate measurements of stars from photographic plates were hopeless, but, fortunately, Merope of magnitude 4.2 varied from 20″ to 38″ on the plates at Oxford. Mr. Barnard subsequently (*Ast. Nach.* 3032) announced that he had found the nebula on photographs of the Pleiades taken at the Lick Observatory, and pointed out that while the usual nebulæ in the Pleiades were wisps and streaks, this was a bright round nebula, and was probably, therefore, not connected with the other nebulæ seen in the same cluster of stars.

Much valuable nebula photography has been carried on at the Lick Observatory, and many extremely interesting results have issued from the splendid staff of workers headed by Professor Holden. The 36in. telescope is devoted to astronomical photography for two nights, to micrometer measures on the next two nights, and to spectroscopy on the following two, when the cycle commences again. As photography necessarily plays a large part in the spectroscopic work, it may be taken as a fair estimate to say that three out of every six nights are devoted to photographic work. Nebular, lunar, and planetary photography are allowable only on two nights out of six, and considering the limited time thus allowed, the amount of work performed is a splendid proof of the grand astronomical weather on Mount Hamilton. Professor Holden (*Pub. Ast. Soc. Pac.*, vol. iii., No. 14, p. 57, and in Sirius, May, 1891) has been comparing the drawings of Bond and of Schmidt with photographs of the great nebula in Orion by Mr. Common with the 3ft. reflector in 1883, by Roberts with his 20in. reflector, and by himself with the 33in. photographic refractor at Lick. All the *stars* seen by Bond are shown on Mr. Roberts' photograph with 205 minutes' exposure, and on the Lick photograph with 58 minutes. With regard to nebula, however, the results are different, for 15 minutes with Roberts's reflector equal 60 minutes with the Lick refractor. The larger aperture of the Lick telescope gives it its great advantage in photographing stars, but the shorter focal length of Roberts's telescope, in proportion to its aperture, accounts for its greater power in delineating nebulæ.

Mr. Common's photograph, with 37 minutes' exposure, does not show all Bond's stars on the print (although it shows more in the original negative).

On comparison with the Lick photograph, 37 minutes with the 3ft. are found to show rather more nebula than 97 minutes with the Lick telescope. Professor Holden (*Pub. Ast. Soc. Pac.*, vol. iii., No. 15, p. 141) has also given us a brief account of the Lick photographs of the great nebula in Orion, made at the end of 1890 and early in 1891. A series of photographs was taken with exposures varying from 5 minutes to 195 minutes, and the relative brightness of the various portions of the nebula can be measured from these with an accuracy impossible to any eye observations. In these investigations it must always be remembered that photographic intensity is not necessarily the same as visual brightness; but in the case of the Orion nebula the photographic and visual observations are practically in strict accordance.

An excellent account of the photographs of the ring nebula in Lyra obtained by MM. Trepied and Rabourdin at Algiers, and by MM. Rayet and Courby at Bordeaux, with the 13-inch refractors to be used for the star charting (*Phot. Ann.* p 107 and 108), is given by Miss Clerke in *Nature*, vol. xliii., page 419. Prof. Holden (*Pub. Ast. Soc. Pac.*, vol. iii., No. 14, page 57) has been photographing the ring nebula with the 33-inch at Lick, and has been able to confirm some of the results obtained by the French observers. The Lick telescope is, as before mentioned, more suitable for stars than for nebulæ, and the typical 13·2 magnitude star, which closely follows the ring nebula, is shown on the Lick plates with 15 to 20 minutes' exposure; 30 minutes give a measurable disc, and 60 minutes a very plain image, although the ring nebula after that time has only just begun to make a complete picture of itself.

In the Annual for 1891 I had occasion to point out that much very useful work in nebula photography can be done with telescopes or photographic lenses of very small apertures. The greatest advances made in nebular photography during 1891 have, indeed, been made with small apertures. Mr. Burnham, of the Lick Observatory, points out that every possessor of a good rectilinear lens and an ordinary landscape camera has the best kind of instrument for making pictures of the sky. The camera must, however, be strapped to a properly mounted telescope, and careful watching must be maintained to ensure perfect movement of the telescope in following the star. Mr. Barnard, at the Lick Observatory, in this way, with an ordinary portrait lens working at f/6, photographed 60,000 stars in the Milky Way on a 8×10 plate in four hours. (*Inter. Ann.* 1891, page 111.)

Dr. Max Wolf, of Heidelberg, has during 1891 been using small apertures, with truly marvellous results, in photographing nebulæ. Dr. Wolf uses Lumière plates with a backing of linseed oil and pine soot to prevent halation. He adds a little oil of turpentine to his hydroquinone developer, and claims that a large amount of extra detail is obtained on his plates by this means.

A little over a year ago Dr. Wolf photographed the Pleiades with a 2½in. aplanatic, by Steinheil, and obtained in one hour all the nebulæ obtained in four hours by the Brothers Henry at Paris with their 13 inch telescope. In photographing stars, the area of the lens is the principal consideration, but for nebulæ the intensity of the photographic image in two photographic

instruments can be compared by the formula $i = \frac{\text{square of aperture.}}{\text{focus.}}$ By this formula Dr. Wolf's Steinheil lens compared with Roberts' 20 inch mirror is as 11 to 4. Since these first experiments Dr. Wolf has used a Kranz-Euryscope of $5\frac{1}{4}$ inches aperture, a 4 inch Vöigtlander-Euryscope, and a 4 inch Millet portrait lens of 12 inches focus.

With these he has obtained a beautiful photograph of the Great Nebula in the Cluster G.C. 1420, in Monocerotis with exposures of $1\frac{1}{2}$ and $2\frac{1}{2}$ hours; has photographed many nebulæ in Ursa Majoris and Leo; and has obtained more extension of the Great Nebula in Orion with 4 hours than Roberts obtained in $4\frac{1}{2}$ hours.

The nebulæ in the Cluster G.C. 1440, suspected by Herschel, is very easily seen in the photographs obtained by Wolf, who has also photographed the nebulæ near ϵ Orionis and G.C. 1267. The latter is distinctly circular in form with fine tangential rays of nebulous matter.

But the greatest and most unexpected results were obtained with the nebula around ζ Orionis (G.C. 1193). Lord Rosse saw and drew a nebula east of ζ Orionis, and Dreyer describes this as a bright star in the middle of a little extended nebula, but no distinct structure was seen. Wolf's photographs with 5 hours 30 minutes' exposure show this nebula as a beautiful spiral structure with several other nebulæ and nebulous stars near. Five other photographs, with exposures from one to three hours, and taken with different lenses, amply confirm this splendid result. (*Jnl. B.A.A.*, vol. i., page 253; *Ast. Nach* 3027)

It was at first supposed that many of these nebulæ were new, but they all appear to have been photographed at Harvard College Observatory with the 8in. doublet of 44in. focus, and are mentioned in the Annals of Harvard Observatory, vol. xviii., No. 6. Prof. W. H. Pickering's photograph of the constellation of Orion (*Phot. Ann.* 1891, p. 108) has led us to believe that the whole of the nebulous matter in Orion is connected to form a huge spiral, and probably a longer exposure, and a more sensitive plate will join all the nebulæ obtained by Dr. Wolf.

Dr. Wolf has also turned his attention to photographing the Milky Way with his Kranz-Euryscope, and has discovered in this manner some marvellous nebulæ in Cygnus. A plate of the Cluster 4621, with three hours' exposure on June 1st, 1891, showed this as a large nebulous mass, which in a very diffuse and complicated manner, connects a number of bright stars with each other and the Milky Way. (*Ast. Nach.* 3048.) The new nebula is a marvellous one, full of excessively fine detail, and exhibiting a very complex structure. Starting apparently from a central point it spreads out in branches, some of which are 8° long. These branches meeting involve large and dense star groups obviously connected with the nebula. Branches pass to the star α Cygni and between the stars 56 and 57 Cygni. Others involve ω Cygni, and the whole structure shows "fold on fold of nebulous matter surging over the sky," and becoming "notably compact and luminous in the immediate neighbourhood of γ Cygni." Miss Clerke points out (*Obs.*, vol xiv., p. 62) that α Cygni is approaching us at a rate of six kilometres per second, and it will be interesting and important to determine whether any of the other stars involved are approaching at the same rate. If so, the connection between the stars and the nebula will be fully established, and the whole of

the stars proved to belong to one system. Mr. Ranyard, in *Knowledge*, October, 1891, publishes three of the beautiful photographs of the Milky Way in Cygnus by Dr. Wolf, and discusses the question of the distance and structure of the Milky Way as revealed by these photographs. One is of the Milky Way about α Cygni, taken September 9th and 10th, 1891, with a total exposure of 13 hours 5 minutes; another is of the Milky Way about ϵ Cygni, taken on July 13th and 14th, with a total exposure of 5 hours (2 hours and 3 hours); and the third is the Milky Way round α Cygni, with 3 hours' exposure. The connection between α Cygni and the fainter stars involved in the nebula seems clear, and an interesting speculation rises as to whether we have α Cygni of magnitude 1·5 and stars of the 18th magnitude at practically the same distance from us. The range of $16\frac{1}{2}$ star magnitudes indicates that the brightest star is 4,000,000 times brighter than the faintest; and if these are equally distant, and we assume α Cygni ten times the diameter of the sun, these smallest stars must then be about half the size of the earth. Unless these bodies are very minute compared with the sun, α Cygni, this nebula, and the Milky Way involved, must be enormously distant and the bright star many times brighter than the sun.

Observations to determine the parallax of α Cygni do not give any measurable result, so that we cannot form any estimate of its actual distance, but the connection between bright and faint stars rendered probable by photographs of Dr Wolf is of enormous value in the study of the structure of the sidereal universe.

Professor W. H. Pickering (*Ast. Nach.* 3054) has been using his 8-inch photographic doublet of 44 inches focus at Mount Harvard in Peru to photograph the nebula G.C. 844, and in a photograph taken on September 8th, 1890, this nebula is shown as a beautiful spiral, two well-marked spiral rays surrounding a distinctly stellar nucleus. The preceding ray turns through an angle of 240°, and the following ray through 130°. Much valuable work is being done on Southern nebulæ by the Harvard College party in Peru, and Professor Pickering is to be congratulated on this admirable photograph.

Mr. Russell, at the Sydney Observatory, has continued the excellent photographic work mentioned in the ANNUAL for 1891, p. 108. He has photographed the nebula around η Argus with his 6in. Dallmeyer lens, giving an exposure of eight hours; and he finds the whole aspect of the region changed, although minute details and dark spots shown on the photographs with three hours are still visible (*Mon. Not. R.A.S.*, vol. li., p. 494). The nebula extends four times as far as is shown in Herschel's drawing; it is brighter and more defined than before, and a dark rift is strongly brought out. The parallel-curved wreaths shown in his last photograph are much more distinct and extended, but seem to require still longer exposures. The dark oval space in the nebula does not show any nebulous light whatever. The complex structure of the central portions is exquisitely shown on a photograph taken with the 13in. photographic lens of the charting telescope, a wealth of detail resembling, but surpassing, that in the great nebula in Orion being obtained for the first time on this plate.

An extraordinary change, the first really authenticated great change in a nebula, is shown on all the Sydney plates. A portion of the nebula, drawn by Herschel, and indicated as being one of the brightest and most con-



Photograph of the Milky Way in the region of α Cygni, by Dr. Max Wolf of Heidelberg, September 9th and 10th, 1891, with 13 hours 5 minutes exposure.

spicuous, has entirely disappeared in the photographs, a dark oval space occupying its place. The wisdom of the plan adopted by Herschel of indicating the positions of the stars involved in the nebula has enabled this change to be detected. Photography will enable any further changes to be at once noticed, owing to the enormous number of stars shown. In one region where Herschel saw 4, the photograph shows 20 stars, and in another portion where Herschel saw one, the photograph shows ten.

Most astronomical photography is performed with reflectors or with specially constructed photographic lenses or object glasses, but much may be done with care by the use of ordinary (visual) refracting telescopes, care being taken to find the actinic or photographic focus, which is always further away from the object glass than the visual focus. With a 12 inch object glass, at Hurstside, West Molesey, Surrey, I obtained several excellent photographs of the moon, of the Pleiades, and of other star clusters in 1888. M. Victor Neilsen, of Copenhagen Observatory, has obtained many successful photographs of the Pleiades, of 61 Cygni, and of the great nebula in Orion, with his 6 inch telescope, and hopes for still better results in 1892 with his $7\frac{1}{2}$ inch. (*Obs.*, vol. xiv., page 62.)

PHOTOGRAPHS OF STAR CLUSTERS AND OF THE MILKY WAY.

At Ealing many star clusters have been photographed during 1891, including M 5, with exposures of 70 minutes; M 12, 70 minutes; Præsepe, M 2, 20 and 60 minutes, and M 53, 40 minutes. Many of the pictures are of excellent quality, and any changes in magnitude of the stars will be speedily detected by examinations of the plates. Mr. Roberts (*Mon. Not R.A.S.*, vol. li., page 442) has also photographed Præsepe with an exposure of 90 minutes. Some of the latest photographs at the Lick Observatory show, with $81\frac{1}{2}$ minutes' exposure, 202 stars in a region of about $\frac{1}{15}$th of a square degree of the cluster in Perseus, where a Paris picture taken in 1884 shows 77 stars after 50 minutes The photographs of the cluster 20 M (Vulpeculæ), with 40 minutes' exposure, show stars fainter than the 13 magnitude, and many more than are shown in the maps by Bessel and by Schultz, the result of several years' work by those excellent observers. A similar result is obtained by comparisons of Pihl's map of M 34 with the Lick photograph taken in 60 minutes (*Pub. Ast Soc Pac.*, vol. iii., No. 14, page 57). Some differences of magnitude are shown in this latter photograph, and may indicate new variable stars, but whether these discoveries are confirmed or not, the photograph certainly shows the enormous advantage of photography over ordinary micrometric work in delineating star clusters.

Photographs of the great cluster in Hercules, taken at Lick on July 28th, show, instead of the single set of dark channels drawn by Lord Rosse, several sets of dark channels. No less than 13 intersections of these channels were counted on the photograph taken on August 2nd, 1891. The longest exposure given to a plate was 2 hours 50 minutes, but four hours seem required to bring out the structure in this wonderful cluster (*Obs.*, vol xiv., page 394)

Photography is the only method by means of which we can hope to obtain any idea of the structure of the Milky Way. The enormous number of stars

involved renders any method of mapping by eye and hand impossible; and naked eye drawings are of little or no value, owing to the great differences between eyes of different individuals. One of the most striking results of the new departure in astronomy is the album which has been produced by Mr. Russell at Sydney, New South Wales. This original and exceedingly interesting production consists of 16 photographs of the Milky Way with a brief description of each. With his 6 inch Dallmeyer lens Mr. Russell has photographed the whole of the Milky Way, from 10 hours to 17 hours in right ascension, *i.e.*, over 100°. The plates, which each cover an area 14° × 10°, had a uniform exposure of three hours, and show stars down to the 15th or 16th magnitude. The Nubeculæ (major and minor), the bright regions of Sagittarius, and other portions of the sky, including the constellation Orion, have also been similarly treated. The Nubecula major, with 7 hours 3 minutes' exposure, is resolved into a well-defined spiral with spiral clusters in the immediate neighbourhood. Each increase of exposure brings out new details, all helping to indicate more closely its spiral character. The Nubecula minor, with 8 hours' exposure, did not assume the dumb-bell shape suggested by the previous shorter exposure, but became spiral and very similar to the Nubecula major. (*Mon. Not. R.A.S.*, vol. li., page 96.) The photographs of Russell have shown a very numerous distribution of stars over three-quarters of the region known, from the absence of visual stars, as the "Coal Sack;" and, instead of the closed space which its visual appearance suggests, it is found there is an opening on the south side. Other dark spaces seen in the Milky Way near β Centauri and α Centauri are also found fairly well covered with stars. Similarly a photograph of the dark rift shown by Herschel in the constellation Argo demonstrates the difference between the eye and the camera, the photograph showing it as being uniformly covered with stars, where the eye sees none. (*Mon. Not. R.A.S.*, vol. xxi., page 497.) Several long meandering narrow lanes or dark spaces are splendidly shown in the photographs, and are so frequent that they may be taken as a feature of the Milky Way.

Some photographs have been taken with the 13 inch charting telescope at Sydney of the Milky Way. One of the most remarkable of these is of the Nubecula Major near 30 Doradus, an exposure of 6 hours 17 minutes having been given. The central parts of the nebula are over-exposed, but the surrounding portions reveal a most complex structure, showing a series of loops arranged symmetrically with regard to the central mass. The stars on this photograph are in long parallel bands, and are so densely crowded together that in places 5,000 or 6,000 are found in a square degree. (*Mon Not. R.A.S.*, vol. li., page 498.)

Mr. Ranyard (*K.*, vol. xiv., page 50, March, 1891) reproduces four of Mr. Russell's excellent photographs, including the long exposures on the Nubecula Major and Minor, taken in October, 1890, and points out on the photographs some differences from previous results. The same author (*K.*, vol. xiv., page 111) calls attention to the curious symmetrical arrangements of stars round the star α Crucis, points out streams of large and small stars, and discusses the photographs of the Coal Sack and of the nebula round η Argus, illustrating his discussion by beautiful reproductions of the photographs.

Dr. Max Wolf, at Heidelberg, has obtained some exquisite photographs of the Milky Way, many of which show nebulæ, and are therefore mentioned under that section. Some extraordinary dark tree-like structures are shown on the photograph of the region round ξ Cygni, taken on September 11th, 12th and 13th, 1891, with 11 hours 7 minutes' exposure, with the 5¼ inch Kranz lens. The darkness of the space and its striking resemblance to a tree seems almost to indicate an irregular branching stream of matter between the earth and the nebulous background on which we see the dark region projected. The borders of this dark space are fringed with fairly large stars, which are obviously intimately connected with it. This structure is plainly shown on a photograph of the same region taken with a 2⅜ inch portrait lens of 7.8 inches focus on September 9th and 10th, 1891, with 13 hours' exposure. Somewhat similar structures are shown on the photographs of the region of ε Cygni by Max Wolf, and on Barnard's photograph of the Milky Way in Sagittarius. Some *bright* tree-like structures can be traced in other photographs. We know the solar prominences are tree-like in shape, and are produced by glowing gas thrust into a resisting medium; in the Orion nebula the tree-like forms may be due to the same cause; have we here in the Milky Way the same gaseous phenomena on a still more colossal scale? (*K.*, vol. xiv., page 230, Dec., 1891.) From a comparison of the photographs obtained by Max Wolf of the region of the Milky Way near α Cygni, with the same region on Argelander's star charts, Espin found (*K.*, vol. xiv., Nov., 1891) 23 new orange and red stars, 38 pale orange, and 36 stars tinged with red, all of them being detected by the faintness of their photographic images, due to their colour. Nine of the stars may turn out to be new variables, but further observations are necessary to confirm this result. Such an abundant harvest has rarely fallen to the lot of an astronomer from one photograph, and is a splendid example of the value of photography for stellar work.

THE INTERNATIONAL PHOTOGRAPHIC CHART OF THE STARS.

The year 1891 will always be memorable in the history of astronomical photography as the one in which the actual work of the international charting of the stars commenced. The last meetings of the permanent committee were held at the end of March and early in April, and the work commenced a few months after that. Most of the countries sharing in the work sent delegates to Paris to attend the meetings of the committee, twenty-five of the leading astronomers of the world thus meeting to promote the greatest work to which photography has ever been applied. The new observatory established by the Pope being intended to assist in the international chart, a representative of the Vatican, Padre Lais, also attended the Congress. Many points for discussion had been raised since the last meeting, and a careful programme was prepared stating clearly the various points at issue. Admiral Mouchez, director of the Paris Observatory, was appointed president, and under his able lead the deliberations were carried on with remarkable smoothness. The first business of the committee was to receive verbal reports of the installations, and with two exceptions these were reported perfect. The exceptions were Santiago, where civil war interfered

(in spite of which Chili was represented at the committee), and Rio de Janeiro, where the observatory and instruments were being removed to a far more favourable site six or eight kilometres from the old observatory. The sub-committee appointed to examine and report on the sample plates submitted by the participating observatories was able to give a most favourable account. The results were remarkably uniform, in spite of the variety of makers of instruments, plates, and methods of photographic treatment adopted.

The manufacture of *réseaux*, or networks of fine lines, which are to be printed on the photographic plates before exposure to the stars, and developed with the star images (*Phot. Ann* 1891, page 111) has not been persevered in at Potsdam. M Gautier, of Paris, has undertaken to make them, and is providing all the observatories not previously suited from Germany. The method of printing the *réseau* on the plate is left wholly to the discretion of each observer. At Greenwich (*Mon. Not. R.A.S.*, vol. li., page 278) the *réseau*, which is 160 mm square, with lines 5 mm. apart, and 130 mm. long, is placed nearly in contact with a photographic plate, and fixed in a frame in front of the object glass, the *réseau* towards the object glass. A small electric lamp (1⅓ candle power) placed in the focus is sufficient to print the *réseau* on the plate in 30 seconds, and an examination of the image thus obtained shows practically inappreciable errors of ruling of the *réseau*. Other observers use a parallel beam from a reflector to print the *réseau*. The value of these *réseaux* is simply incalculable, for by their use the positions of the stars on the plates can be rapidly and easily measured and accurate astronomical co-ordinates obtained.

On the question of plates and processes the committee leave everything to the discretion of the workers. The uniform quality of the sample plates submitted renders this course less risky than would appear on first sight, but it is to be regretted that Dr. Eder's report on the best methods of preparing and developing plates for the international chart has not been published. It was announced in September, 1889, that the experiments were completed, and that the MS. would be sent to Paris in a fortnight; but the report has not appeared in either of the two bulletins issued since then, and probably will not do so after the decision of the committee. Captain Abney (*Obs.*, vol. xiv., page 175) severely criticises some of the plates sent in, calling attention to the fact that the sensitiveness in many cases had been increased by a preliminary fogging in the process of manufacture.

The next great point discussed was the proposal to first make the whole of the exposures necessary to catalogue the stars down to the 11th magnitude, and afterwards to commence the exposures for the photographic chart down to the 14th magnitude This would mean delay in the production of the chart in order to hasten the catalogue. Many of the astronomers held that the members of the first International Congress did not contemplate such undue importance being attached to the catalogue. It was held that the chart to the 14th magnitude was of first importance, and the catalogue was of less interest, except to those used to the preparation of such works. After considerable discussion it was decided that as far as possible the plates for the catalogue and for the chart should be produced together, no prominence being given to either series.

The question of the exposure necessary to secure the required result was the one which provoked most discussion. In the 5th Bulletin of the Comité, published in 1890, the question had been discussed by Professors Holden and Schœberle of the Lick Observatory, and M. Trepied had insisted upon the necessity for strictly defining the 9th, 11th and 14th magnitudes (*Mon. Not. R.A.S.*, vol. li., page 261.) The Astronomer Royal at Greenwich found $1\frac{1}{2}$ minutes showed all stars down to the 9th magnitude, and that from 25 to 30 minutes were necessary to give the 14th magnitude. He therefore advised exposures of 4 minutes and 1 minute for the catalogue plates, and of 30 minutes for the chart plates (*Mon. Not. R.A.S.*, vol. li., page 278). Mr. Plummer, of Oxford, found that all stars down to the 9th magnitude in the Pleiades were impressed in 17 to 20 seconds, but in order to get satisfactory star discs for 14th magnitude stars at least 90 minutes' exposure was necessary (*Obs.*, vol. xiv., page 146). With such widely differing results it was necessary to proceed with great caution. Another point intimately connected with this was also the cause of considerable discussion. The absolute visual brightness of two stars which differ by one magnitude is such that roughly 2·5 times the light of the fainter star will equal the brighter star. Thus, a star of the 9th magnitude is equal to 2·5 10th magnitude stars, and $2{\cdot}5 \times 2\,5$ 11th magnitude stars, and so on. It is usually assumed that within limits the density of deposit on a photographic film is directly proportional to the brightness of the light to which the film was exposed. With a star image on a plate we have not a definite area equally illuminated, but a central point round which the image grows as the exposure is prolonged. If we could measure the mean density of the star image it might be possible to estimate differences of magnitude in this manner, but it is obvious that to measure length and breadth are not sufficient; depth (or density) must be measured as well. The first Congress on astronomical photography had assumed that magnitudes could be measured by direct measurement of diameters, and that this being so all that was necessary to determine the requisite exposure to obtain the 14th magnitude on the chart plates was to determine the exposure required for 11th magnitude. and multiply by $2{\cdot}5 \times 2{\cdot}5 \times 2{\cdot}5$.

Dr. Max Wolf, at Heidelberg, found from a series of measures of star images that the photographic diameter of a star increases by the logarithm of the time of exposure, and that doubling the exposure increases the photographic image by a constant quantity. (*Ast. Nach.* 3006.) In a later paper *Ast. Nach.* 3019) he finds from measures of stars in a photograph of the Pleiades that the connection between visual and photographic magnitude is not rigid, but that it can be illustrated by a curve. Treating plates of a cluster G.C. 4410 according to this curve, and comparing the magnitudes obtained with the eye estimations on Valentine's and the Bonn charts, he finds the results not accordant, since the absorptive effect of the atmosphere at 15° and 40° altitude may produce a difference in photographic brightness amounting to as much as half a magnitude.

Dr Scheiner, of Potsdam, at the last meeting of the Comité at Paris, contended that the complex character of the disc rendered the principle of giving 2·5 times the exposure to get a star of the next fainter magnitude unsafe. He discussed the formulæ given by Wolf, and by Charlier and Glyden, of Stockholm,

showed how these results are not accordant, and how they did not agree with the Potsdam experiments. Dr. Scheiner found from his measurements that for faint stars an increase of 2·5 in the exposure in some cases only corresponds to an alteration of ·53 in the magnitude of the stars photographed. He also experimented by means of diaphragms placed over the object glass of his telescope; and by photographs of the Pleiades and of the Orion he found that the increase of 2·5 in exposure corresponds more nearly to ·7 of a magnitude than to the whole magnitude assumed by the Congress. Dr. Scheiner's table shows that assuming that 24 seconds are sufficient for a 9·5 magnitude star, to get the 14·5 magnitude, an exposure of 3 hours 11 minutes would be required instead of 29 minutes, as assumed by the first Congress (*Ast. Nach.* 3054). Against these startling results we have the Greenwich values of from 25 to 30 minutes; the 40 minutes' exposure at Paris, and the 70 to 90 minutes at Oxford necessary to secure the 14th magnitude. Differences of instruments, plates, manipulation, and atmospheric conditions, may explain many of these discordances, and the discussion principally served to show the utter impossibility of founding general rules from the examination of a few photographs.

Atmospheric conditions play a very large part in all astronomical photography, and the experience at Ealing and at Crowborough is that whereas on some nights one hour exposure may only show a few stars, on other nights, to all appearances not so good, a considerably shorter exposure to the same region of the sky will show many hundred of stars. These results are confirmed by Charlier and by Schœberle (*Pub. Ast. Soc. Pac.*, vol. iii., No. 17, page 288) from such widely separated stations as Stockholm and the Lick Observatory. The suggestion of the Astronomer Royal (*Mon. Not. R.A.S.*, vol li., page 278) that all observatories should follow the example of Greenwich, and on every night before commencing work test the atmospheric conditions by varying exposures on Polaris, say from 2 seconds to 1 minute, and from this plate determine the exposure necessary to obtain the 14th magnitude, seems practically the only way out of the difficulty.

Ultimately the permanent committee decided that each observatory should determine the time necessary to photograph the 9th magnitude stars (these appearing in Argelander's charts), then place a series of wire gauze screens in front of the object glass, so as to stop five-sixths of the light, and thus determine the time of exposure necessary to obtain the 11th magnitude. The exposure to be given to the chart plates (to the 14th magnitude) is to be obtained by multiplying the number of minutes thus found by 40 (the number of minutes' exposure necessary at Paris to get 14th magnitude) and dividing by the number of minutes' exposure necessary at Paris to photograph the 9th magnitude stars with the screens in front of the object glass. It was hoped that uniform results would be thus obtained, and instrumental and photographic differences overcome. The actual time of beginning the work of charting was delayed to enable the necessary experiments with screens to be made. The gauze screens have been thoroughly well tried, but the results with them were found very unsatisfactory.

Professor Pritchard (*Compt. Rend.*, December 28th, 1891) notes that the screens produce diffraction phenomena, which render estimation of magnitude impossible. He also points out that screens do not have the same effects on the photographic magnitude as on the visual. This he attributes to the use

of lenses, for with a reflector the visual and photographic effects are equal. The Astronomer Royal (*Obs.*, vol. xiv., page 257) also announced similar difficulties in the use of screens. The committee have consequently abandoned them, and the determinations of the exposure necessary for 11th magnitude stars have been made from a list of standard 11th magnitude stars for each observatory, prepared at Oxford by eye observations. Each of the catalogue plates will have two exposures, one just sufficient to impress the 11th magnitude, and the other, after the plate has been moved one-fifth of a millimetre, with twice that exposure. On each of the catalogue plates there will be six stars, the positions of which are to be determined by meridian observations, and from these the measurements necessary to get exact positions of all the stars on the plates can be made. This will necessitate 60,000 or 70,000 stars being observed to enable the catalogue of all stars down to the 11th magnitude to be obtained. The first series of the chart negatives are to have a single exposure; but for the duplicate series, covering the four corners of the plates of the first series, observers may, if they choose, give three exposures, each one-third the total exposure, moving the telescope between the exposures so that the three images form an equilateral triangle. It is believed that by this latter method stars will be more certainly identified from dust and other defects in the plates.

The remainder of the resolutions were of a purely technical character, and dealt with such subjects as orientation of the plates, their measurement, preservation, etc. A sub-committee was appointed to decide upon the best means of reproducing the chart, and a strong opinion generally expressed that the method of reproduction ought to be a photographic one. (*Obs.*, vol. xiv., page 175.) It was decided that the search for asteroids (the minor planets) did not fall within the scope of the work of the committee, and that longer exposures in the ecliptic would not be authorised.

The total number of plates to be taken is 22,000, covering approximately 41,000 square degrees. Eighteen observatories will assist in the work, and the distribution of zones proposed by the Astronomer Royal (*6th Bulletin of the Committee*) and adopted by the committee is as follows:—

OBSERVATORY.	ZONE.	NUMBER OF PLATES.
Greenwich	from 90° N. to 65° N.	1149
Rome	,, 64° N. ,, 55° N.	1040
Catania	,, 54° N. ,, 47° N.	1008
Helsingfors ..	,, 46° N. ,, 40° N.	1008
Potsdam	,, 39° N. ,, 32° N.	1232
Oxford	,, 31° N. ,, 25° N.	1180
Paris	,, 24° N. ,, 18° N.	1260
Bordeaux	,, 17° N. ,, 11° N.	1260
Toulouse	,, 10° N. ,, 5° N.	1080
Algiers	,, 4° N. ,, 2° S.	1260
San Fernando ..	,, 3° S. ,, 9° S.	1260
Tacabaya	,, 10° S. ,, 16° S.	1260
Santiago	,, 17° S. ,, 23° S.	1260
La Plata	,, 24° S. ,, 31° S.	1360
Rio de Janeiro ..	,, 32° S. ,, 40° S.	1376
Cape	,, 41° S. ,, 51° S.	1512
Sydney	,, 52° S. ,, 64° S.	1400
Melbourne	,, 65° S. ,, 90° S.	1149

The proceedings throughout the meetings of the committee were characterised by the utmost enthusiasm. Several paragraphs in the newspapers in April gave hints of stormy proceedings, but these were fruits of the fertile imagination of the reporters. It is a singular fact that with one exception the whole of the resolutions were unanimously adopted. The spirit which animated the members is eloquently described by Admiral Mouchez in the words with which he closed the conference:—"You have had to treat of difficult questions, and you have treated them without reference to any other thought than that of truth and the progress of science. Divergencies of views have exhibited themsleves as to the means to be employed, never as to the end to be attained. These divergencies were inevitable, they were even necessary; they have only made us see the questions in a clearer light, and have never disturbed the cordiality of your relations. The unanimity which has marked your final decisions is a certain pledge of ultimate success. It is in this conviction that I declare the conference of 1891 closed, and the work of the photographic chart of the heavens commenced."

During 1891, 204 negatives were taken at Greenwich, in connection with the International Chart, the total number of exposures being 830. Most of these were experimental for determining the relation between diameter of image, duration of exposure, and brightness of star. Forty-five plates, with 108 exposures, were taken with screens in front of the object glass, in addition to the 204 mentioned above. The actual charting work performed was almost *nil*, but at the present time everything is in proper order, and the work has commenced. At Oxford, notwithstanding the delay caused by the investigation of the effects of the wire gauze screens, a considerable number of the plates comprised in the zone assigned to that Observatory have been completed. Numerous experimental photographs were also taken, and Professor Pritchard (*Mon. Not. R.A.S.*, vol. li., page 430) communicated the results of the examination of these to the Royal Astronomical Society in May, 1891. Photographing some regions in Peter's charts, with varying exposures, he finds 31 per cent. of the stars with 3 min., 42 per cent. with 4 min. (these being all to 10·5 magnitude), 62 per cent. with 6 min. (all to 11 or 11·2 magnitude), 78 per cent. with 8 min. (all to 11·5 or 11·7 magnitude); and even after 15 min. all the stars are not shown, although there are probably none fainter than the 12th magnitude. He finds as a general result that with plates of the Pleiades an increase of 2·5 in exposure does not give an increase of 1 in magnitude photographed; and that while a 5th magnitude star in 50 seconds gives an image 9 divisions of his scale in diameter, a 9th magnitude star in $(2{\cdot}5)^4 \times 50$ secs., or 32·5 minutes, only measures 7 divisions. As to the actual charting work performed at other observatories, there are very few reports published. At the Cape of Good Hope Dr. Gill found the crown glass of his object glass defective, and brought it with him to Europe. It was refigured by Sir Howard Grubb, and now gives good photographic images. Non-arrival of plates delayed the actual work at the Cape, but the proper plates arrived on Jan. 12th, 1892, and work is now proceeding. At Melbourne the telescope was erected in January, 1891, and experimental work performed, but here again delay in arrival of plates prevented much actual work. At Sydney, about fifty catalogue plates have been taken, but some of these may have to

be re-taken, owing to hazy weather. Hot weather haze in October, November, and December is so bad that exposures up to 30 minutes fail to give 11th magnitude, whereas 3 or 4 minutes are sufficient on good nights. It would seem, therefore, that the Greenwich experience of only 12 hours 49 minutes available for exposure in 31 days is not the worst in the world. At Sydney, as at Greenwich, some trouble has been found in the formation of pinholes in the silver film of the *réseau*.

By this time next year we shall probably be in possession of full information as to the actual course of the work, and shall be able to contrast the atmospheric and other conditions at the various stations. It is very satisfactory, however, to know that the much talked of international photographic chart of the stars is thoroughly well commenced, and that most of the difficulties have now been overcome.

The quantity of literature on the subject has of course been enormous, and to give a list of articles would occupy far too much space. I would, however, specially commend an article, with four illustrations, in *Engineering*, December 10th, 1890, on the photographic telescope for Melbourne made by Sir Howard Grubb. This instrument may be taken as typical of those at Greenwich, Oxford, the Cape, and Sydney, for all these were made by Grubb on the same plan.

GENERAL STELLAR PHOTOGRAPHY.

The Cape photographic catalogue of stars mentioned in last year's ANNUAL (page 112) is practically complete, and is already in use for the selection of guide stars for the international scheme. During 1891, 36 plates were taken at the Cape of regions of the sky that were not satisfactorily shown on the first series. Professor Kapteyn, of Gröningen, who has undertaken the measurement and reduction of the Cape photographs, reports under date November 8th, 1891, that in all only about 100 plates remain to be measured, including the 36 new photographs obtained. It had been hoped to have completed the work before November, but the unexpected richness of some regions of the southern sky had occasioned the delay, and the rejection of 36 plates had further increased the work necessary to finish the catalogue. The enormous quantity of work done may be gathered from the fact that 750,000 measurements have been made in addition to the 86,000 on the rejected plates, and by the time the whole series is completed considerably over a million measurements will have been made. The catalogue will furnish places for about 280,000 stars, whereas in this portion of the sky the fullest previous catalogue only included 72,000 stars A statement of the present state of star catalogues will be interesting. Argelander's catalogue of stars from the North Pole to 2° south declination includes about 320,000 stars; Schönfeld's extension from 2° south to 23° south declination includes 130,000 stars; and the Cape photographic catalogue will give 280,000 stars, the grand total thus being about 730,000 stars. This includes all stars down to nearly the tenth magnitude.

In connection with the Cape photographic work a very curious and interesting discovery was made by comparing the Cape photographic magnitudes with the magnitudes given by Dr. Gould in his catalogue of 72,000 stars in the same portion of the sky. The photographic and visual magnitudes

generally agreed, although in some cases variability was detected, and thus several new variables were added to our catalogues by the aid of photography. In the Milky Way, however, the stars when photographed were found to be constantly one-half or three-quarters of a magnitude brighter than the visual magnitude. This means that the stars in the Milky Way are as a rule photographically twice as bright as they appear visually. The explanation of this extraordinary circumstance has been furnished by Professor Pickering, of Harvard College, U.S.A., who has been photographing the spectra of the whole of the stars. He finds that the stars in the Milky Way as a rule belong to the first type; that is, to the hottest type, with few and broad dark lines, and a very great extension on the blue end of the spectrum. The stars in the Milky Way are, in fact, blue stars, and appear to be of about equal age. It follows, therefore, that the Milky Way is most probably in an earlier state of evolution than the other portions of the sky. The evidence of connection between the stars in the Milky Way furnished by Dr. Max Wolf's photographs of nebulæ is fully confirmed by the spectroscopic photographs of Harvard College, and by the Cape determinations of magnitude; and the whole credit of this brilliant discovery must be given to the aid photography has afforded astronomy. The Harvard College photographic catalogue of stars, made from plates taken with an 8-inch doublet of 44 inches focus is not yet completed, although the sets of negatives were finished in 1889. The Observatory at Harvard has been exceedingly busy in photographing stars and their spectra (see Stellar Spectroscopy), and several thousands of plates have been taken. At Chosica, in Peru, and later on at the new station of Arequipa (8,000 feet high), the photographic work has been continued, and the negatives for the photographic catalogue of the southern stars are nearly finished.

Professor Pritchard, at Oxford, has continued his invaluable investigations of Stellar Parallax by photography (ANNUAL, p. 114). The determination of the parallax of stars is a work of exceedingly great interest and importance, for knowing the parallax of a star we can calculate its actual distance from us, and can compute its actual light-giving power.

Professor Pritchard announces (*Mon. Not. R.A.S.*, vol. li., page 224) that his investigations have now included all the second magnitude stars, and that the parallax for 19 stars has been fully computed by photography. All the necessary exposures for the remaining ten stars have been made, and the results for four of these are fully reduced, while the remaining six await computation. Photographs for the determination of the parallax of γ Draconis, and of two faint stars which give different results in the determination of the relative parallax of α Cephei, are also in progress, the 13 inch photographic charting telescope being used instead of the 13 inch De la Rue reflector. Some experiments have been made for the determination of the parallax of planetary nebulæ, but owing to the faintness of these objects the exposures have to be so much prolonged that the change of refraction introduces very large uncertainties, and therefore absolute values cannot be expected. The project has on this account been relegated to observatories having larger optical appliances. Pritchard has also (*Mon. Not. R.A.S.*, vol. li., page 310, and *Ast. Nach.*, 3037) published his results for the parallax of β Aurigæ, one of the stars the duplicity of which was so unexpectedly revealed by photographs of its spectrum taken at Harvard College in connection with the photographic

spectroscopic survey of the stars. Fifty plates were used by Professor Pritchard, these plates having been taken on 25 nights. Five minutes' exposure as a rule was given in the De la Rue 13 inch reflector of 10 feet focus. Two comparison stars were used, and the results, independently computed, gave values of + 0·065″ and + 0·059.″ These results are so accordant that their mean may be taken as the absolute value. A parallax of ·063 of a second of arc means that a line 180,000,000 miles long would, at the distance of this star, be reduced to ·063 of a second of arc. Applying the values obtained by Professor Pritchard to the double star β Aurigæ, the distance between the centres of the components of which is given as 1,650,000 miles by Dr. Vogel, we find that the actual widest separation of the two stars, as observed from the earth, would be ·005.″ As probably no telescope in existence can measure an angle to ·01 of a second with anything like certainty, we see that the spectroscope, aided by photography, has here enabled us to detect a double star which is far beyond the reach of any instrument we can hope to make. Taking the largest telescopes in the world, and the highest powers used with them as the correct measures of the relation between aperture and dividing power, we find that an *aperture* of 80 feet would be necessary to observe β Aurigæ as a double star in the same way as the closest double star is seen with our best telescope. The atmosphere of the earth would not allow sufficiently high powers to be used, even if the telescope could be made which would carry them.

Professor Pritchard finds that he cannot apply his photographic method to the measurement of the parallax of such stars as ζ Ursa Majoris, γ Andromeda, γ Leonis, and ε Bootis, because they have faint companion stars at such small distances from them that the photographic images coalesce on the film if the necessary exposure is given to get the faint comparison stars. This is a definite limitation of the use of photography for this work, and is freely admitted by Professor Pritchard, who advises the use of eye observations with the heliometer to determine the parallax of these stars.

Mr. Maunder (*Jnl. B.A.A.*, vol. ii., page 25) has computed the actual light giving power of all the stars the parallax of which has been determined either by photography or by eye observations. Placing the sun as unity, and classing it as 26·5 magnitudes brighter than the average first magnitude star, we have the following absolute light giving values, as calculated from the results of parallax observations:—

Sirian Stars.	Times brighter than the Sun.
β Cassiopeiæ ..	12·3
α Persei ..	83·0
Sirius ..	42·4
Procyon ..	23·7
Regulus ..	108·0
α Lyræ ..	2048·1
α Draconis ..	1·7
α Aquilæ ..	25 8
α Cepbei ..	67·8

Solar Stars.	Times brighter than the Sun.
α Cassiopeiæ ..	59·7
η Cassiopeiæ ..	5·1
β Andromedæ ..	41·5
Polaris ..	188·5
α Arietis ..	58·9
Aldebaran ..	71·3
Capella ..	217·7
Pollux ..	166·1
η Herculis ..	6·4
π Herculis ..	8·0
ε Cygni ..	21·2
Arcturus ..	6226·9
The Sun ..	1·0

During 1891 photography has been used at very many observatories for stellar work, and several of these have provided themselves with special apparatus for the purpose. The Vatican Observatory, established by Papal Brief, in the Leonine Fort, surmounting the Vatican Hill, at Rome, is to be devoted almost entirely to astronomical photography. An interesting account of the foundation of this observatory is given by A. L Cortie, S.J., in the *Observatory*, vol. xiv., page 226, and the first fascicule of its publication (1891) gives, in addition to the Papal Brief, two interesting papers on astronomical photography, the first being a short history of the subject, and the second a full account of the visit of Father Lais to Paris to represent the Vatican at the meeting of the Committee on the International Chart.

The old Observatory at Palermo has been dismantled and a new observatory, specially suited for photographic work, established in Catania. Professor Ricco has here erected his charting telescope, together with a photographic telescope of 15 c.m. aperture. At Dunsink Observatory in Ireland a 15-inch reflector has been used for photographic work, and 55 plates with 136 exposures obtained. Special attention has been devoted to star clusters, and some good photographs of the cluster in Perseus obtained. At Lord Rosse's Observatory, Parsonstown, Ireland, some experimental work on astronomical photography has been undertaken, and the results are so encouraging that Dr. Boeddicker is going to photographically study the Milky Way in order to supplement his naked eye work on that region. At Wolsingham Observatory, near Darlington, the Rev. T. E. Espin has been using his 18-inch reflector for photography, and has obtained some photographs of the Milky Way in the region of α Cygni. The variability of the star D.M. + 39°·4208 was discovered and confirmed by these photographs.

A photographic section of the British Astronomical Association has been established during 1891 for the purpose of encouraging and assisting amateur astronomers in photographing celestial objects, and also to acquire a set of lantern slides. Under the energetic direction of Mr. Schooling, much valuable work may be expected from this flourishing young society. At their meeting in November the use of ordinary refractors and of ordinary photographic lenses was advised, and the special value of Dallmeyer's new combination for astronomical photography fully dealt with (*Jnl. B.A.A.*, vol. 2, page 80).

An interesting addition to our knowledge of the early work in astronomical photography may be expected from a full discussion of Rutherford's photographs, recently presented to Columbia College, New York. A full catalogue of these (*Anns. N.Y. Acad.*, vol. vi., June, 1891) shows that the set taken between 1858 and 1878 comprises 359 solar photographs, 436 lunar photographs, 701 stellar photographs, and 37 miscellaneous. Full measurements of these by Dr. Rutherford, Professor Rees, and Mr. Jacoby are promised, and many very valuable results may be confidently expected.

Photography has been extended still further into the work of astronomical observatories during the year 1891. As early as September, 1857, only a few years after Bond, at Harvard College Observatory, had photographed stars for the first time in the history of astronomy, he strongly insisted upon the value of photography for meridian observations to measure small fractions of time (*Pub. Ast. Soc. Pac.*, vol. iii., No. 15, page 125). The subject has been raised several times since then, but little or no practical advance has been

made. An account of an instrument called a photo-chronograph for photographically recording transits of stars is given in vol. xviii., No 3, page 402, of the Woodstock College Print, Woodstock, Md., U.S.A. Prof. Safford in America has also been investigating this subject, and Prof. Pickering (*Am. Ann.*, vol. xl , page 218) has been able to measure time to ·03 of a second by means of photography. Other investigations by Father Fargis, assistant at Georgetown Observatory, U.S.A., and by Professor Bigelow at Harvard, in 1889, improved the method, and as a result Mr. Saegmuller, of Washington, the Rev Father Hagen, director of Georgetown Observatory, and Prof. Bigelow have co-operated, and devised a much improved photo-chronograph. The principle is simple, a star trail across a photographic plate being broken up into a series of dots by moving the plate, these movements being brought about by electric currents regulated by a standard clock. As a result of a long series of experiments, it is found that the average error in the estimation of time is about one-hundredth of a second. This great precision, the freedom from variable personal equation (which often introduces errors of ·1 of a second), and the permanence of the record are enormous advantages for the photographic method over the eye and chronograph method now generally used.

For longitude work, for determining possible variations of latitude, and for all work requiring great accuracy, the photographic method far surpasses the method now in use, while the cost of making the necessary alterations of existing instruments is quite insignificant (Bigelow, *Ast. and Astro-Ph.*, Jan., 1892, pages 42-49). Father Hagen, S.J. (*Ast. Nach.* 3,058), has been using the photo-chronograph at Georgetown Observatory for measurement of double stars. The image of Mizar was allowed to trail slowly across the plate, and instantaneous exposures were given every second, with periodical interruptions for purposes of identification of the seconds; 60 or 70 images are thus produced, and these can be measured with an accuracy equal to any of the usual methods of observation.

An ingenious method of comparing the photographic brightness of very bright with very faint stars has been devised by Professor Pickering at Harvard (*Obs.*, vol. xiv., page 221). A prism of *very small angle* is placed in front of a portion of the doublet of a photographic telescope, and, as a result, the plate contains two images of every star. The prism covers one-tenth of the aperture of the doublet, and the faint companions to each star are necessarily one-tenth the intensity of the principal images. By comparing the faint companion of a bright star with the principal image of a faint star the difference in magnitude between the bright and faint star is much more accurately determined than by a comparison of the principal images. Prof. Holden, at the Lick Observatory, has been making some interesting experiments on the possibility of photographing the moon, planets, and stars in the daytime. He finds (*G. A. J.*, No. 219) that with the 33in. refractor and with lesser apertures, Venus, Mercury, the moon, and α Lyræ can be photographed between 2 and 5 p.m. with exposures of ·13 of a second. To observe the planets Venus and Mercury, or a bright star like α Lyræ, in broad daylight, is an achievement rarely accomplished with the naked eye, although in a telescope such observations are not difficult. It is an interesting and surprising fact that the photographic plate is sufficiently delicate to record such a minute contrast as a star point on a bright sky.

As mentioned in last ANNUAL (page 112), the constants of photographic refraction are different from those of visual refraction. The Brothers Henry have published an important memoir on this subject during 1891. (*Compt. Rend.* cxii., p. 577.) Their method of determination is to put a fine *réseau* in front of the object glass of the photographic telescope, the lines of the *réseau* being truly parallel to the vertical plane passing through the optic axis of the telescope. On photographing stars with this arrangement, instead of a horizontal spectrum on opposite sides of the central image of each star, curved spectra are obtained, and from the tangents to these curves the required results are readily calculated. They find that at a zenith distance of 80°, photographic and visual refractions differ by about 5″, and that photographic refraction is always greater than visual; therefore a star with zenith distance 80° will appear 5″ higher when photographed than it appears to the eye, or in a telescope used for eye observations. Generally, in photographic work, all visual refractions should be increased in the ratio of 1·0156 to 1, or practically one sixty-fourth part, to get correct photographic refraction. Jacoby, of Columbia College, New York, has also investigated the corrections of photographic measures for refraction, and gets a similar result. (*G.A.J.*, No. 237, page 163.) Chandler criticises Jacoby's formulæ (*G.A.J.*, No. 238, page 175), and is replied to by Jacoby. (*G.A J.*, 240, page 191.)

SIDEREAL SPECTROSCOPY.

A large proportion of the great advances made in sidereal spectroscopy during 1891 are due to the enormous energy of Prof. E. C. Pickering at Harvard College Observatory, where, with a staff of between 30 and 40 assistants and a plentiful supply of instruments, provided by Mrs. Draper as a memorial to her husband, Dr. Henry Draper, a spectroscopic survey of the stars in the northern heavens has been completed, and a catalogue published. In the 45th annual report of Harvard College Observatory for the year ending October, 1890, a splendid record of work appears. Over 30 stars, with bright lines in their spectra, had been discovered up to that time; and over 100 stars with spectra of the third type, containing dark flutings fading away towards the red. From this report we learn that during the year October 1889 to October, 1890, 2,157 photographs were obtained at Harvard, and 1,309 at Chosica in Peru, whither the 8-inch Vöigtlander doublet with the prisms to place in front for spectroscopic work on stars, had been removed.

On December 20th, 1890, Professor W. H. Pickering, with two assistants, Messrs. Douglas and Vickers, left Harvard, to establish a new observatory in connection with the Draper Memorial at Arequipa, a station over 8,000 feet high. The station at Chosica has been abandoned by Bailey, and the 8-inch Voigtlander doublet, with the whole of the apparatus and observatories removed to the new station. From here it is intended to photographically chart the whole of the region of the sky from 20° South declination to the South Pole with exposures of 10 minutes and 60 minutes, and in addition to obtain two series of spectrum plates with the same exposures. All stars down to nearly the 7th magnitude will record their spectra on the short exposure plates, and stars to the 9th magnitude on the longer exposed ones.

It is expected to finish the star photographs in one year, and to repeat the first series every year during the existence of the observatory at this

station. The Boyden telescope of 13in. aperture has been removed to Arequipa from Wilson Peak, California, and is to be used for enlargements of the moon, a diameter of 6ft. being aimed at for the completed picture. Planets, double stars, clusters, and nebulæ, will also receive attention; and there is every prospect of even more valuable results from Harvard, and the observatories connected with it, than the brilliant work already achieved. The necessity for a fire-proof building to store the 27,000 negatives already existing has been met by the generosity of Mr. J. I. Bowditch, who has presented 25,000 dollars for that purpose; and the priceless collection will soon be safely housed.

Vol. xxvi., part 1 of the "Annals of the Astronomical Observatory of Harvard College," is entitled the "Preparation and Discussion of the Draper Catalogue," and is, undoubtedly, the book of 1891 on stellar spectroscopy.

In this marvellous catalogue details of the spectra of 10,351 stars, deduced from measurements of 28,266 photographic spectra are given. This list includes all stars down to practically the 7th magnitude in the region from the North Pole to about 25° South declination. The instrument used for this survey was the 8in. Vöigtlander doublet of 44in. focus, a prism 8in. square, and having an angle of 13°, being placed in front of the doublet with its refracting edge parallel to the Equator. In this manner an area of the sky of 10°, square degrees, was covered by each plate. The spectrum of each star formed a thin line on the plate, and by altering the rate of clock driving so that the telescope did not exactly follow the stars, any required breadth could be given to the spectra. The spectra were ·4 of an inch in length and usually ·04 of an inch in breadth. Three or four exposures were usually made on each plate to reduce the cost to a minimum, and no difficulties were met with in identifying the stars thus crowded together. The photographs were taken by Messrs. Clayton, Gerrish, and Gifford, and were examined and measured by a staff of ladies primarily under the charge of Miss N. A. Farrar, and latterly under that of Mrs. Fleming.

Immediately Professor Pickering attempted to put his star spectra into classes, he found that Secchi's classification was insufficient. While maintaining the main classes of Secchi, he formed four varieties: A to D, of type I. stars; eight varieties, E to L, of type II. (the solar type). M is the third type; N the fourth type, of which no representative appears in the catalogue; O is used for stars with bright lines in their spectra (which Pickering recognises as belonging to a distinct fifth type); P contains the planetary nebulæ; and Q the outstanding stars, which cannot be placed in any of the other classes. Gore finds (*Jnl. B.A.A.*, vol. ii., page 129) that by keeping to the old classification we have, recorded in this catalogue in the region of the Milky Way, 1,940 Sirian stars, 1,100 solar stars, 15 class III. stars, and six which are in neither of the old classes. In short, 63·4 % of the Milky Way stars belong to the old type I., while only 36·6 % belong to the other classes. The importance of this is pointed out on page 130 of this article.

One of the greatest advances made in the catalogue is the bold innovation of measuring magnitudes of stars by the intensity of the G line in their spectra. This line, practically in the centre of the photographic region, is a truer measure of magnitude than the usual visual plan or any other method

yet suggested, and the relative magnitudes measured in this manner are quite independent of the colour of the stars.

The comparison of photographic spectra with the visual observations of Vogel and Duner is very interesting and valuable, and splendidly illustrates the great advantage of photography for this kind of work. Thus, of 169 stars, of type I, by Vogel, 105 are shown to belong to type I., and 64 to type II. Of 42 stars of type II., by Vogel, 4 are type I., and 38 are of type II A still more striking result is shown by a comparison with Duner's catalogue of type III. Of 116 stars classed as type III., by Duner, and appearing on the Harvard plates, 3 are of type I , 71 of type II., and only 42 of type III.

In addition to the Draper catalogue a very considerable amount of valuable work has been issued from Harvard during 1891. As the examination of the plates has proceeded, many new variable stars, and many stars with remarkable spectra, have been recorded from time to time. Professor Pickering announces (*Ast. Nach.* 3008) new variable stars in Triangulum and Hydra, and six stars with peculiar spectra are recorded, four of these containing bright lines, and two belonging to type IV. In *Ast. Nach.* 3,011 two variables in Perseus, four new bright line stars, and three of type IV. are announced, while a second note in the same number records two other new bright line stars, and two stars containing both bright and dark lines.

Pickering's fifth type of spectra shows a very curious grouping in the heavens. (*Ast Nach.* 3025) as many as 33 bright line stars were known at the time of publication of the proposal for a fifth type, most of them having been discovered by photography. These stars are mainly situated in the Milky Way (in this respect strongly resembling the planetary nebulæ), and fall into three main groups, each of which may be inclosed on a circle of 8° diameter. The cluster of these stars in Argo contains 7 stars, that in Scorpio 5, and in Cygnus 8 Only three stars of this type are comparatively isolated, *i.e.*, more than 10° from any other of the type; while half of them are found in a region of $\frac{1}{300}$th of the whole sky. It is, of course, impossible to say whether this is due to a common origin of all, but the grouping is sufficiently remarkable to lead to the belief that there must be some real connection between the stars of this type. A further group of three similar stars is found in Cepheus (*Ast. Nach.* 3070), bringing the total number known up to the end of the year to 38. This new group is right in the central line of the Milky Way.

Pickering announced three new variable stars, with bright lines in their spectra when at maximum brightness, in *Ast. Nach.* 3025, and a new variable, in Sagittarius, discovered by the same characteristic; a new planetary nebula, and a new 5th type star in *Ast. Nach.* 3049. A further communication (*Ast. Nach.* 3054) announces a new variable in Lacerta, confirms the variability of a suspected variable star, and introduces a star apparently of type IV., with bright lines in its spectrum, which sometimes appear as broad bands, and on other occasions as double lines.

An examination by photography of the spectra of visual double stars has led to a valuable extension of the number of spectroscopic double stars (Pickering, *Ast. Nach.* 3034). The components of visual double stars frequently differ in magnitude and colour, and almost invariably the bright component is yellow or red, while the faint companion is blue. The spectroscope shows



Photograph of the Milky Way in the region of β Cygni, by Dr. Max Wolf of Heidelberg, September 25th, 29th and 30th, 1891, with 12 hours 6 minutes exposure.

that the brighter stars usually belong to the solar type (II.), while the fainter blue stars are usually of the hottest type (I.) Any double stars, too close to be seen separated, would give compound spectra in which the thin dark lines of the solar type would be associated with the very broad diffuse lines of the Sirius type (type I.)

If the stars are rapidly moving binaries, like the stars β Aurigæ and ζ Ursa Majoris (PHOT. ANNUAL, pages 116 and 117), they will not show the periodical doubling of the lines noticed in the spectra of those stars, but will show periodical displacements of the broad lines. Several stars, previously supposed to be single, have been proved to be binary stars in this way.

The periodical doubling of the lines, as in such stars as β Aurigæ, occurs when the two components of the spectroscopic binary are practically equal in size, and give similar spectra; but when, as in the case of many visual double stars, the components are unequal in size, and give dissimilar spectra, the periodical displacement of certain lines will be the result of the rapid revolution of the stars round each other. Four spectra of the star α Canis Minoris (Procyon) have been measured, and a comparison of 21 measures of the distance of the G line, with 24 measures of the line H, show that the spectrum is a compound one, and that the star is a binary, with the faint companion moving in a direction away from the earth at a rate of 20 kilometres per second. Ten other stars, two of which show visible companions, have been found to have compound spectra of this class. The magnificent discovery of the periodical doubling of the lines in β Aurigæ has thus led to the discovery of a large number of invisible double stars or spectroscopic binaries, which we can never hope to see double with the most powerful telescope it is possible to construct.

A new kind of star has been revealed in 1891 by examination of the Harvard photographs. It was well known that the star β Lyræ had bright lines in its spectrum, and that these lines had a curious variability. The bright lines showed extraordinarily bright at some times, and were excessively faint at others. Dark lines had been seen on other occasions instead of bright lines. To investigate these peculiarities, Professor Pickering took 29 photographs at various times, and the measurement of these has led to the discovery of a new class of double star, the spectra of which always contain bright lines and dark lines (*Ast. Nach.* 3051). The star β Lyræ shows an extraordinary variability, its period of variation being 12 days 22 hours, but this total period has two maxima and two minima. Starting at 4·5 magnitude, the brightness of the star increases rapidly until, in 3 days 5 hours, it has attained the magnitude of 3·4, that is, in 3 days 5 hours it has increased to 2·75 times its former brightness; it then decreases in brightness until, at 6 days 11 hours, it is of the 3·9 magnitude, or has fallen to 1·25 times its original brightness; a second rise then occurs, and in 9 days 16 hours the star is of the 3 4 magnitude, from whence it falls, until in 12 days 22 hours it has reached the 4 5 magnitude, and starts again on a similar cycle of change. Fourteen of the spectrum plates, taken in the first half of the period of variation, showed the bright lines on the blue side of the corresponding dark lines; eleven, taken in the second half of the period, showed the bright lines on the red side of the corresponding dark lines. The others give doubtful results, and several complications arise, such as the occasional

doubling of the bright lines. The photographic observations extend over four years, thus including 130 variations of the star. The general result of the discussion of the photographs is that the star is like β Aurigæ, but with one component giving bright and the other dark lines. A very probable explanation is that a meteor swarm in the form of a captured comet revolves round the dark line component in a period of 12 days 22 hours, and thus gives rise to the extraordinary variability of the star and its spectrum. The maximum relative velocity of motion shown by the photographs is 300 miles, thus giving 50,000,000 miles as the least distance between the centres of the two components.

These results have been fully confirmed by photographs taken at South Kensington, where the study of stellar spectra has been taken up with the use of a six-inch photographic object glass, with one or more prisms in front of it, and also with a ten-inch ordinary visual telescope with suitable prisms. Beautiful photographs of the spectra of most of the bright stars have been obtained, the definition being exquisite. From these photographs the chemical composition of the stars is now being deduced, and thus an enormous mass of exceedingly valuable information will be obtained.

Prof. Pickering has announced (*Rep. Harv. Coll. Obs. 1890*) that a photograph of the spectrum of σ Herculis shows doubling of the lines like β Aurigæ, and (*Sid. Mess.*, vol. x., January, 1891) that η Ursa Majoris is similar, thus bringing the number of known stars of this particular kind to five.

From the large number of photographs of spectra at Harvard College, Prof. Pickering has selected the spectra of nine stars for the purpose of ascertaining the distribution of energy in stellar spectra (*Ast. Nach.* 3069). The intensities of rays of different wave lengths were determined by comparing the densities of different portions of the photographed spectra; and the results thus obtained were compared with the distribution of energy in the sun's spectrum, as determined by Professor Langley and Mr. Very. The stars selected represented all the types, and the spectrum of Saturn was also included in the series. The densities of twenty points in each spectrum were measured, and the results, given in the form of a table, present some curious facts. On inspection it is at once possible to pick out the red stars, these giving spectra comparatively weak in the extreme ultra-violet portion of the spectrum. The stars α Aurigæ (Capella) and α Canis Majoris (Sirius) are very similar in the table, thus showing that the former star, although resembling the sun in general type of spectrum, is more nearly allied to the Sirian stars in the distribution of energy in its spectrum. Saturn, while shining by reflected sunlight, appears bluer than the sun from an examination of the spectrum in this manner. The explanation of this apparent anomaly lies in the selective absorption of Saturn, that planet apparently stopping more of the longer than it does of the shorter wave lengths.

Mrs. Fleming announces (*Sid. Mess.*, vol. x., page 7) the discovery of 18 stars with peculiar spectra on the Harvard and Chosica plates. Pickering announces (*Sid. Mess.*, vol. x., page 106) two new variable stars discovered in Aquarius and Delphinus respectively, from their photographed spectra, another variable in Camelopardis (*Sid. Mess.*, vol. x., page 152), and a new planetary nebula (*Sid. Mess.*, vol. x., page 240). Such a brilliant record of discoveries during one year is unprecedented in the history of astronomy, and

is all the more impressive since it is at the very beginning of the work, for the study of Stellar Spectroscopy by photography at Harvard has only received considerable attention since 1886, although Professor Pickering really commenced working at the subject in 1882.

Drs. Vogel and Scheiner, at Potsdam Astrophysical Observatory, have continued their splendid work at stellar spectra by the aid of the spectrograph, or photographic spectroscope, permanently attached to the 11in. telescope. An exceedingly valuable book, entitled "Die Spectralanalyse der Gestirne," by Dr. Scheiner, has been issued during 1891. The preface is written by Dr. Vogel, and the book may be taken as embodying the latest results and latest thought at Potsdam. The book is divided into four parts, the first of which deals with the practical aspect of the study, while the second is devoted to the theoretical principles involved. The third part collects all the results of the Potsdam spectroscopic work at stars, and gives their explanation and interpretation according to the principles enunciated in the second part of the book. The fourth part consists of tables of wave lengths, of lines measured in stellar spectra, and of other materials which readily lend themselves to expression in tabular form. An excellent bibliography forms a valuable appendix. The Potsdam photographic results in the third portion are of great interest. The direction and velocity of motion of a star in the line of sight is easily determined by photographing the spectrum of a star with a slit spectroscope, and then, without altering the adjustments, photographing across the stellar spectrum the bright lines of hydrogen, of magnesium, or of iron. If the star is neither approaching towards nor receding from the solar system (although it may have any motion at right angles to the line of sight), the lines of the terrestrial element used will be found exactly coincident with the corresponding stellar lines. If the star is approaching us the line in the star spectrum will be found on the blue or more refrangible side of the comparison line, whereas if the star is receding from us the dark line will be on the red side. By measuring the amount of displacement thus photographically found, the rate of motion of approach or recession can be accurately ascertained. The value of photography for this work is readily seen by a comparison of photographic results with visual observations. Atmospheric tremors, faintness of lines, and personal equation, in accurately placing a fine wire on the star line and then in moving it on to the comparison line so as to measure the amount of displacement, introduce large errors; and it is not unusual to find differences of ten or more miles per second in different determinations of one star on the same night. Atmospheric tremors do not affect photographic spectra, the faintest lines are easily obtained by prolonging the exposure, and no movements of any part of the spectroscope are necessary during the determination; while an advantage greater than all these is that there is absolutely no personal equation in the photographic plate. In addition we have a further advantage in being able to measure the displacement with several lines in the photograph, while only one can be used in the visual method.

Dr. Scheiner records that at Potsdam the velocities of twenty-two stars in the line of sight have been determined, and the average rate of motion is found to be 10½ miles per second. Aldebaran, which is receding from us at 30½ miles per second, is the star found to be most rapidly moving, while Arcturus, which is approaching at 4·9 miles per second, and α Cygni at 3·7

miles per second, are those with least motion. In the case of Procyon a very striking result has been obtained. Dr. Huggins, in 1867, measured the motion of this star by the visual method, and found a rate of approach of 6 7 miles per second. In 1871, Dr. Vogel, at Potsdam, with the visual method, obtained an extremely rapid motion of retreat; and this result was confirmed by photographs taken in 1888. Other photographs taken in 1890 show a motion of approach closely agreeing with that found by Dr. Huggins in 1867. A case like this requires very careful investigation, and a close photographic watch will be kept upon this star for many years, so that its irregularities will be fully recorded and an explanation sought. A similar result has been found with Sirius (*Obs.*, vol. xv., page 39), both by eye observations at Greenwich, and by photography at Potsdam.

During 1891 the determination of motion in line of sight has been largely extended at Potsdam. Dr. Vogel reports (*Mon Not. R A.S.*, vol lii. page 87, and *Obs.*, vol. xv., page 35) that two hundred negatives of forty-nine stars have been obtained and measured, and that the exactness of measurement far surpasses the expectation based on the first plates. Full descriptions of the instrument used and of the method of work are given. A uniform exposure of one hour has been adopted, the width of the spectrum being varied to correspond with the brightness of the star. The spectrum of Venus photographed with this apparatus shows a perfect agreement with the calculated velocity, and photographs of the moon spectrum have amply confirmed the accuracy of the adjustments. Iron is sometimes used as a comparison spectrum for type I. stars, but in the majority of cases hydrogen is most convenient. One result of great importance was to firmly establish the influence of the earth's motion round the sun on the displacement of lines in stellar spectra, and a long table of measures with four stars illustrates this. The correction for the earth motion is, therefore, always applied. The mean result for forty-seven stars is 10·6 miles per second, six stars having a velocity of less than two miles, and five a velocity greater than twenty miles. Fifteen of the stars are approaching the solar system, and thirty-two are receding from it The probable error of *a single* determination of a star of type I. is ± 2·31 miles per second, and of a type II. star ± 1 34 miles per second, but with a large number of photographs a much greater accuracy is obtained. Dr. Gill (*Proc. R.I.*, May, 1891), in describing the increased accuracy due to the use of photography for this work, says: "At a single step Dr. Vogel has raised the precision of the work from that of observations in the days of Ptolemy to that of the days of Bradley– from the days of the old sights and pinnules to the days of the telescope"; and when we consider the enormous advances made, even this comparison, extravagant as it may seem, is justified. He further says: "In a few years . . . . we shall not be content to correct our results for the motion of the earth in its orbit . . . . but we shall have arrived at a certainty and precision of working *which will permit the process to be reversed*, and we shall be employing the spectroscope to determine the velocity of the earth's motion in its orbit, or, in other words, to determine the fundamental unit of astronomy—the distance of the sun from the earth."

The results obtained with β Aurigæ, ζ Ursa Majoris, α Virginis, and Algol (*Annual*, 1891, pages 116-118), have been amply confirmed during the past year. Vogel (*Ast. Nach.* 3017) gives the result of an examination of all the spectrum plates of β Aurigæ and ζ Ursa Majoris taken at Potsdam. As

early as 1888, Nov. 14th, the double lines in β Aurigæ had been photographed; but no particular attention was paid to them, and an important discovery was thus left for Pickering at Harvard College. One interesting new fact, obtained from the Potsdam photographs, is that the whole system is receding from us at the rate of 4·03 miles per second. There is also some slight inequality between the components which divide the whole period of four days into unequal parts, but in all other respects the first results are found to be correct. The accurate period of revolution is 3 days 23 hrs. 36 7 min. (Vogel, *Ast. Nach.* 3039). With ζ Ursa Majoris the lines might have been expected to appear double on three of the early Potsdam plates, but only a widening is shown. The long period, 105 days, of this binary star, and the very elliptical orbit, cause the lines to appear single for long periods and double for short ones; and it is therefore easy to understand why the discovery was not made previous to 1890.

With Algol the latest results show that the bright star of this remarkable group has a motion of recession of 24·5 miles per second 17 hours before the maximum brightness of the star is reached, and a motion of approach of 28·5 miles per second 17 hours after maximum. The eclipse explanation of variability for this star is fully confirmed. The bright and dark components of this binary are about equal to each other in density. The dark component is about equal in size to our sun, although it has only a quarter its mass. It moves at the rate of 56 miles per second, the bright component, with twice its mass, moving at 26 miles per second. The components are nearly three and a half millions of miles apart. The whole system is approaching us at the rate of 2·4 miles per second.

The latest results with α Virginis (*Ast. Nach.* 3039) make no new addition to our knowledge, although they fully confirm the previous photographs.

Three interesting stellar spectrum photographs from Potsdam are given in a paper by Dr. Koerber, in *H. und E.*, No. 4, January, 1891, and others are given by Dr. Gill in the report of his lecture at the Royal Institution, in May, 1891.

At the Paris Observatory, in addition to the continuation of the work of the brothers Henry (mentioned on page 118 of last ANNUAL), M. Deslandres has been paying very considerable attention to stellar spectroscopy. (*Compt. Rend.*, Nov. 23, 1891) He has adopted the method of observation which was used by Prof. Lockyer for observing the spectrum of the nebula in Orion in Jan., 1890, modifying the arrangements so as to do the work by photography instead of by the eye. In this method a fixed horizontal telescope is used, and the image of the star to be photographed is reflected into this by a mirror mounted upon a specially-constructed stand. The image of the star is kept fixed upon the slit of the spectroscope by slowly moving the mirror, the necessary motion being communicated by clockwork. In this arrangement, all the moving parts are several yards away from the telescope and spectroscope, and consequently heavier and more powerful spectroscopes can be used, while the strains ordinarily introduced into the telescope and spectroscope, by alterations of position due to the telescope following the star, are avoided.

Applying this instrument to a determination of motion in the line of sight, the photographs showed, with comparisons lines of Iron, that Sirius was receding from us on March 3, 1891, at the rate of 19 kilometres per second. The earth at this time, owing to its motion round the sun, was approaching

Sirius at the rate of 20·2 kilometres per second; it therefore follows that, on that date, Sirius was approaching the solar system at the rate of 1·2 kilometres per second.

The photography of the spectra of nebulæ requires such long exposures, and the results are even then usually so meagre, that very little work is done in this direction. Dr. Huggins has announced (*Mon. Not. R.A.S.*, vol. xi., page 229) the discovery of four, or perhaps five, new lines below G in the spectrum of the great nebula in Orion. There is distinct evidence also of several new lines in other portions of the photographed spectrum. Professor Lockyer, at South Kensington and at Westgate, has been working at the spectra of this and other nebulæ with considerable success, but no account of the results is yet published. At Ealing, with the five-foot reflector, some preliminary work has been performed, and a new spectroscope is being constructed, specially adapted for this work.

Professor Hale, at Kenwood Astrophysical Observatory, Chicago, has photographed the magnesium fluting at 5,005; his results do not confirm the origin suggested by Prof. Lockyer for the nebula line near this position. (*Sid. Mess.*, vol x., page 23.)

Dr. Huggins has been again photographing the spectrum of Sirius, and six new lines, forming a group in the ultra-violet, have been found on two photographs. The whole of the ultra-violet hydrogen lines are now known to exist in this star (*Mon. Not. R.A.S.*, vol xi., page 229). The full extent of the ultra-violet spectrum of hydrogen was first indicated by photographs of stellar spectra, a simple formula for the whole series being discovered from an examination of the photographs; but the full laboratory confirmation of the series is yet to be worked out.

Several articles of general interest on the photography of stellar spectra have appeared during 1891. One of the most valuable of these is by Professor Young (*C. et T.*, No. 7, June, 1891), in which the recent work on determination of motion in line of sight is described, and one in *Sirius* for April, 1891, describing the Potsdam spectrograph.

In the invaluable presidential address of Dr. Huggins at the Cardiff meeting of the British Association, a well-merited tribute is paid to the splendid spectroscopic work of Pickering and Vogel, and an admirable general review of astronomical progress since 1860 is given.

SOLAR PHOTOGRAPHY.

The study of the solar surface by photography is part of the regular work at Greenwich Observatory, the instrument used being the 4 inch Dallmeyer photo-heliograph made in 1858. Since that year a daily record has been obtained as far as the weather would allow, but the climatic conditions at Greenwich are very unfavourable for this work. Special observatories were therefore established at Dehra Dun in India, and at Mauritius, and a photo-heliograph was also sent to Melbourne, daily photographs being taken at these places so as to supplement the Greenwich series as far as possible. The Astronomer Royal reports (*Mon. Not. R.A.S.*, vol. lii., page 245) that during 1891 photographs of the sun were taken at Greenwich on 224 days, and 525 of the photographs thus obtained have been selected for preservation. A new 9-inch photographic telescope has been adapted for the purpose of photograph-

ing the sun with an image eight inches diameter, and with this new instrument photographs were taken on 15 days from November 10th to the end of the year. The large aperture of the new photo-heliograph has necessitated exceedingly short exposures, and a specially contrived exposing slit has had to be made for the purpose. Photographs have been received from India and Mauritius up to 1891, November 30th, but fourteen days out of the 365 immediately preceding that date are still unrepresented. This is an unusually large number, but many of the vacancies will probably be filled by the photographs taken at Melbourne and Potsdam, and in connection with the general solar photography done at Meudon. The sun during 1891 has shown a decided increase of activity; only 21 days were without spots, whereas in 1890 there were 173 days. The photographs since March 29 all show spots of some kind, many of the groups being very large and complicated. The group which appeared on August 28th was specially noteworthy as being the largest since June, 1885.

Mr. Maunder, who has charge of the solar photography and the measurement of the solar pictures at Greenwich, has compiled, from the photographs taken there, a valuable history of this spot group (*Jnl. B.A.A.*, vol. ii., page 119). The group appeared on the eastern edge of the sun on Aug. 28th, and consisted of two principal spots 6° of heliocentric longitude apart. The photographs show that one of these spots remained practically stationary, while the other moved through 1° of longitude per day, this corresponding to a movement of between 7,000 and 8,000 miles per day. The total area of the spot group, at its first appearance on Aug 28, was only 100 millions of square miles, but the size increased very rapidly, and on Sept. 7th the area was 2,000 millions of square miles. Owing to the rotation of the sun on its axis (in a period of about 25·38 days), the spot group was carried round to the western limb or edge, and disappeared Sept. 10th, reappearing on the eastern limb on Sept. 25th. It was then much diminished in size, the spot which had, in five days, rushed forward for about 40,000 miles, had slowly drifted back, and when it died out on Oct. 5th it was approximately in the place at which it was first formed. This life history of a spot group is typical, and admirably illustrates the tremendous forces at work on the solar surface.

The great value of photography for solar work lies in the fact that the pictures obtained are instantaneous. Several pictures taken at short intervals frequently show considerable changes in the form and size of spots. Any attempts to make drawings of spots are rendered difficult by these changes, and, although the Stonyhurst drawings are still continued, their main object is to supplement rather than to rival the photographic work.

At Greenwich the sole object in photographing the sun is to get measurable pictures from which the positions and areas of solar markings can be ascertained. They do not aim at producing pictures which may throw new light on the actual appearance or ultimate constitution of the solar surface. Mr. Ranyard, in *Knowledge* (Jan., 1891), gives an excellent example of what photography can do in delineating details on the solar picture; the glorious detail of one of Janssen's fine enlargements being used to illustrate the points of an able article on the sun's photosphere. To compare this with a Greenwich photograph splendidly illustrates the enormous advance in photographic methods since 1858, for while 4-inch pictures were considered remarkable in 1858, at the present day the finest results of Janssen are with such enlarge-

ment that the diameter of the complete solar image would be between five and six feet.

The Astronomer Royal (*Mon. Not. R.A.S.*, vol. lii., page 24) gives full details of the measurements of the photographs taken during 1890, and a comparison with previous years. The increase of solar activity as compared with 1889 is a sure sign that the period of minimum sun-spots has been passed; and the entire disappearance of all spots near the sun's equator confirms this. No spot nearer the equator of the sun than 18° was shown on the Greenwich photographs in 1890.

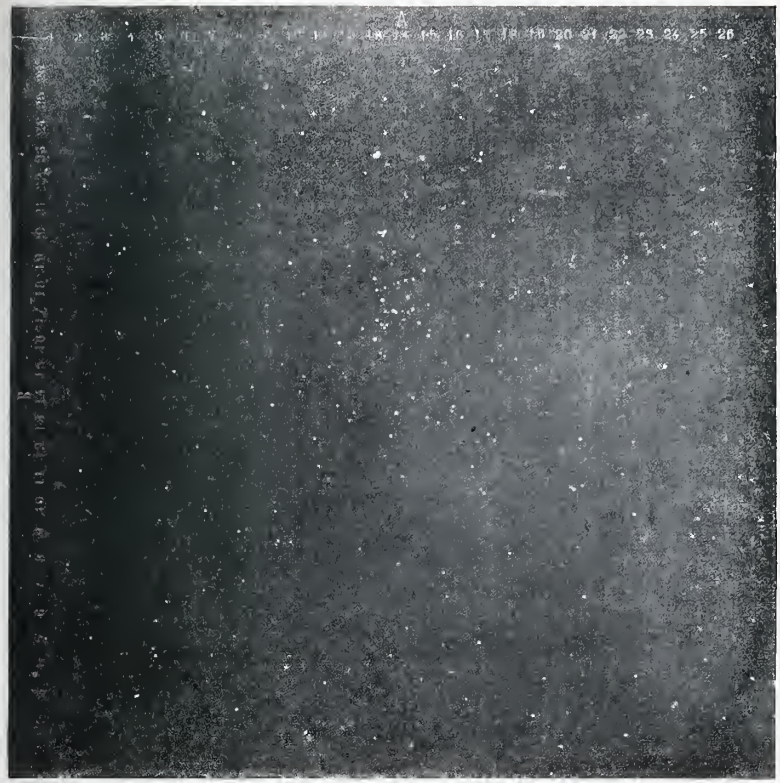
Maunder (*Obs.*, vol. xiv., page 59), discussing this question, finds that only one spot in the equatorial zone was shown on all the photographs taken at Greenwich or elsewhere, while there were four groups more than 30° of latitude away from the equator.

SOLAR ECLIPSE PHOTOGRAPHY.

During 1891 there were no opportunities for observing or photographing a total solar eclipse. The only eclipses during the year were (1) an annual eclipse on June 6, central only in the extreme N.E. of Asia, and visible as a partial eclipse in North America and N.W Europe; (2) a partial eclipse on November 30—December 1, visible only in the Antarctic Ocean. Photographs of partial phases of a solar eclipse serve only for checking the calculated positions of the sun and moon, and do not in any way assist us in our study of the solar corona.

Many points raised by former eclipse work have been discussed during 1891, and the full results of the Washington University Eclipse party which went to Norman, California, for the eclipse of 1889, January 1st, have been published. The party consisted of five observers, and photography played an important part in the work, the photographic equipment consisting of an equatorial camera, with a Dallmeyer lens of 6 inches aperture and equivalent focal length of 37·9 inches. Owing to difficulties with the exposing shutter the effective aperture had to be reduced to 4·5 inches, but this probably increased the sharpness. Six photographs were obtained, with exposures of ½ sec., 3 secs., 6 secs., 28 secs., 18 secs., and 13 secs. respectively, the plates being at once developed by Professor Charroppin. The greatest extension is obtained on the negative with 28 seconds' exposure, and all the negatives substantially agree with the photographs obtained by the Lick Observatory party at Bartlett Springs. The great equatorial extension characteristic of the solar corona at sun spot minimum is shown on the long exposure plate extending to more than one degree from the sun (two diameters); while the short exposures give the best pictures of the thin polar filaments always found on coronal photographs.

It is only by photography that we have been able to make any definite advances in the study of the solar corona, but the photographic records are at present more valuable as suggesting directions for future work than for establishing any theories as to the constitution of the external portions of the sun. Prof. H. S. Pritchett finds that two points calling for special attention in the immediate future are raised by the photographs of the party at Norman in 1889, Jan. 1 (*Pub. Ast. Soc. Pac.*, vol. iii., page 161). (1.) It is



SAMPLE OF INTERNATIONAL PHOTOGRAPHIC CHART OF THE STARS

The Cluster 7 M, by Dr. Gill, at the Cape of Good Hope.

specially desirable to photograph the outer coronal streamers, and special photographic outfit must be designed for this work. (2.) The corona should he photographed from points as widely separated as possible. These points are, curiously enough, two of the three questions for the solution of which the Eclipse Committee of the Royal Astronomical Society arranged the programme of observations of the eclipse, 1889, Dec. 21-22. The detection of possible changes in the corona was impossible owing to the dense cloud at Cape Ledo, S.W. Africa, which effectually prevented photographs of any kind at that station; while the unusually moist climatic conditions at Salut Isles rendered the photographic evidence of great coronal extension inconclusive. The next eclipse of the sun favourable for photographic study will be in 1893, April 15-16, and already the Eclipse Committee of the Royal Astronomical Society, several American observers, and Count de la Baume Pluvenel, are making arrangements for expeditions to observe and photograph it. Commencing in the South Pacific, the central part of the moon's shadow strikes the west coast of South America at Sarco, in Chili, lat. 29° S., crosses the South American continent in the space of one hour, issuing at Fortaleza in the province of Ceara, lat. 4° S., crosses the Atlantic in the space of another hour, and enters Africa between Bathurst and Dacca, near to the small settlement Joal, finally leaving the earth in the interior of the Sahara. The period of totality is longer than usual, being 4 min. 42 secs. in Brazil, and 4 min. 13 secs. in Africa. The astronomical conditions are best in Brazil, but the meteorological conditions there are very unfavourable, the number of rainy days in April averaging over 50 per cent., while as many as 25 rainy days and 24in. of rainfall have been recorded.

In Africa, on the other hand, there is no record of rain in April at any place on the line of totality. There is a chance of obtaining results from a station 200 miles north of Santiago, in Chili, and these, compared with African photographs, would enable any changes in a corona to be detected. It is probable that two expeditions will be sent from England, one from France to Africa, and several from North America will go to Ceara.

Professor Charroppin (*Pub. Ast. Soc. Pac.*, vol. iii., page 22) insists that future observers should pay great attention to the purely photographic portion of the subject. The aim up to the present has been to obtain on the one negative a perfect picture of four different light-giving objects differently illuminated and requiring four different exposures, viz., the actinic protuberances, the bright inner corona, the polar filaments, and the extremely delicate shadings of the extended streamers. His proposals are to use orthochromatic plates throughout, to carefully exclude all foreign light from the plate, to give short exposures for the inner corona, and long exposures, up to, say, 50 seconds for the outer corona, and to photograph each wing of the corona independently.

Professor Bigelow (*Obs.*, vol. xiv., page 50) also discusses this question, and develops a theory to account for the trumpet-shaped extensions and polar filaments found on the Lick photographs of the eclipse of 1889, January 1st. He advocates the use of less sensitive plates than have hitherto been used, so as to photograph all the fine details without the blurring due to skylight.

Professor Schæberle has been photographing, from different aspects, a sphere with straight needles projecting from it, and finds that he can in this manner obtain most of the appearances shown on coronal photographs.

On the question of standardising photographic plates for eclipse work, so as to measure the actual actinic brightness of different portions of the corona, an interesting contribution has been published by Professor Bigelow (*Sid. Mess.*, vol. x., page 386). After discussing previous work on this subject, he shows by experiments that very variable results may be obtained from two plates of the same batch by exposures to a standard lamp; and suggests that the simplest way out of the difficulty is to select "bits of buck of varying shade," and place them in the right order by trial. This may afford escape from the present unsatisfactory condition of the method of standardising eclipse plates, and enable photometric measures to be made.

SOLAR SPECTROSCOPY.

The greatest advance in 1891 in the application of photography to the study of solar spectroscopy is undoubtedly due to Professor George E Hale, of the Kenwood Astro Physical Observatory, Chicago, U.S A. As mentioned in last year's ANNUAL (page 124), Mr. Hale has been working at this subject for some time, and his great skill and perseverance have at last been rewarded. The history of the study of solar prominences is a record of some of the most brilliant achievements of spectroscopy, and offers two remarkable cases of simultaneous discovery of new methods by independent observers. In early observations of eclipses of the sun a number of red or rose-pink flame-like projections were frequently seen round the black disc of the moon at totality. These red prominences, as they were called, were attributed by some astronomers to the moon, and by others to atmospheric causes. It was only when photographs had shown that the moon passed in front of these phenomena, and that the prominences on the advancing side of the moon's black disc decreased in size from their bases upwards, while those on the following side increased in size from their tips downwards, that their solar origin was firmly established. The spectroscope turned on to these prominences showed at once a spectrum of bright lines, and thus settled the question for ever in favour of the solar origin. For several years astronomers had had to wait for eclipses in order to observe these phenomena, but after the total eclipse of 1868, M. Janssen, still at his observing station, and Mr. Lockyer, who had hurried to England immediately after the eclipse, independently devised a method of observing the prominences without an eclipse. The principle involved is very simple. In observing a spectrum, the greater the dispersive power used the fainter the continuous spectrum becomes. Bright lines depend in width entirely upon the width of the slit employed, and are not affected in intensity by the amount of dispersion used. We had learned from eclipses that the sun was surrounded by an atmosphere of gases and metallic vapours which gave spectra of bright lines, but except at an eclipse the glare of the sunlight had rendered it impossible for this to be spectroscopically examined. High dispersive powers would diminish the brightness of the continuous spectrum due to the glare, while it would not alter the intensity of the bright lines. In other words, the continuous spectrum would be so spread out that it became inappreciable, while the bright lines remained practically unaltered. By casting an image of the sun upon the slit plate of the spectroscope, and arranging that the slit was partly covered

by the sun's edge and partly by the sun's atmosphere, it was discovered that whenever a prominence was falling on the slit, the field of the spectroscope was partly filled with the ordinary solar spectrum, while in certain parts bright lines, due to the gases in the sun's atmosphere, projected beyond the edge of the solar spectrum.

Most of the lines due to hydrogen were thus seen bright, and in addition to these a line in the yellow (D_3) corresponding to no known terrestrial substance; and the lines H and K in the violet, due to calcium. By allowing the sun to drift slowly across the radial slit, and measuring the alterations in length of the bright line, it was possible to draw the form of the prominences. Dr. Huggins adjusted his spectroscope to observe the red hydrogen line (C), placed his slit tangential to the sun's edge, and on widening the slit was able to observe the complete forms of prominences at once, almost as clearly as they were observed at eclipses. Adjusting the spectroscope for the yellow (D_3) line the prominence forms could be seen just as clearly; and this was true for all the principal bright lines. We were thus able to see prominences, red, yellow, greenish-blue or violet, according to choice, without waiting for eclipses. Many attempts were made to photograph the prominences, but the plates were invariably ound to be hopelessly fogged.

C. Braun, of Mariaschein, Bohemia, in 1872 (*Ast. Nach.* 1899, and *Pog. Ann.* vol. cxlviii., page 475), suggested that a radial slit giving a fine line should be used for the prominences, and that only this line should be allowed to pass through a very fine slit in front of the photographic plate placed in the focus of the spectroscope. By allowing a prominence to drift across the slit of the spectroscope, the length of the bright line passing through the second slit would vary. By moving the photographic plate under the second slit at the same rate as the sun drifted, the form of the prominence would be built up on the plate by a succession of lines in contact with each other. A modification of Braun's process, in which the $H\gamma$ line was to be used, is described in the report of the Haynald Observatory at Kalocsa, pages 160-163. All attempts to carry out the operation failed, owing to photographic and mechanical difficulties. Lohse, in 1880, tried a similar operation and failed. (*Konkoly's Himmels—Photography*, page 346.) Thus was the state of the problem when Hale, in 1889, commenced his work at Harvard College.

Hale (*Ast. Nach.* 3006) describes his early investigations at Harvard College with the 12in. horizontal telescope. He independently devised the method suggested by Braun in 1872, and an additional method in which the sun's image and the photographic plate remain stationary, while the slit plate of the spectroscope and the secondary slit in front of the plate move together. A strip of orthochromatised celluloid film was to be used, and the red (C) line and the yellow line (D_3) photographed. The 36in. telescope at Lick, and the 23in. at Princetown, were generously placed at the disposal of Mr. Hale, but the offers were declined owing to the difficulty of adapting the special apparatus to those instruments, and the 12in. at Kenwood Astrophysical Observatory at Chicago was specially constructed to carry out the work. The movement of the plate was to be regulated by a glycerine piston, the clockwork of the telescope being used to regulate the sun's movement across the slit of the spectroscope. This was the position of affairs when the article in last year's ANNUAL was written.

The first results with the new apparatus were more successful than had been anticipated. (*Ast. Nach.* 3053) Photographing the region of the H and K (calcium) lines in the ordinary manner, Hale found these dark lines invariably had bright lines down their centres. The presence of the hydrogen bright line at wave length 3970 25, and of three otber new bright lines in the sun's atmosphere, was also established. The H and K lines always have a dark band round them, and this, together with the great strength of the bright line, led Hale to abandon the idea of using the C line, and to try his new apparatus with these. The experiments were successful, and on May 7th, 1891, a solar prominence was photographed with a considerable amount of detail. Daily photographs are now taken at Kenwood, and will lead to a very considerable increase of our knowledge of the sun.

At the eclipse of 1886 an enormous *white* prominence was seen, extending to a height of 150,000 miles from the edge of the sun. This was photographed on all the plates exposed, but a careful search before the eclipse had not recorded it, and after totality it was sought for in vain. We are here in presence of solar phenomena, which we can only hope to see at eclipses, for the whole of the light of these prominences is quite invisible in our spectroscopes. These *white* prominences are, however, rich in calcium, and their spectra show the H and K lines strongly developed. By Mr. Hale's magnificent work we are now placed in a position to photograph these at any time, and photography will enable us to study not only the visible prominences, but the invisible ones also. When we consider the intimate connection between sun-spots and prominences, and the great influence of sun-spots on the magnetic condition of the earth (such as was manifested on Feb. 13th, 1892, when the telegraphic and telephonic service were seriously disturbed by a magnetic storm, due to an enormous spot on the sun), the great value of Mr. Hale's discovery will be recognised.

It is a curious coincidence that just as Lockyer and Janssen independently and simultaneously discovered the method of *observing* prominences without an eclipse, in an exactly similar manner the problem of *photographing* the prominences should have been successfully solved by independent workers.

M. Deslandres, at the Paris Academy of Science, August 17th, 1891, exhibited some of the successful photographs of prominences which he had obtained during May, 1891, and since that month. His photographs of the solar spectrum showed H and K strongly reversed, just as Mr. Hale had found them, and also showed the first two lines of hydrogen in the ultra-violet as bright lines. From the great strength of the reversed lines H and K he had been led to attempt to photograph prominences by their aid, and had been completely successful. Mr. Hale, however, had the honour of being the first by a few days to successfully photograph prominences; and his success, following as it does after a long and patient research, has been thoroughly well deserved.

A young English observer, Mr. Evershed, of Kenley, Surrey, with a $2\frac{3}{4}$ inch equatorial and a small spectroscope has succeeded in obtaining some most creditable photographs of prominence forms. (*Mon. Not. R.A.S.*, vol. lii., page 294)

At the British Association meeting at Cardiff in 1891, Hale gave a list of eight new lines in the ultra-violet, which had been shown by photography to

exist in the spectrum of the sun's atmosphere. These were discovered during his investigations in prominence photography.

At the same meeting Professor Piazzi Smyth gave a characteristically worded and exceedingly strong report from the Committee on Research in Ultra-violet rays of the solar spectrum, describing the great superiority of the photographic method of mapping spectra as compared with the eye and hand method. Two photographic records are more trustworthy than any number of hand-drawn maps; photography records what the eye ought to see but cannot, and gives true pictures in "spite of perversion and misuse which may be humanly committed upon this most exquisite aid."

Professor Rowlands, in the John Hopkins Circular No. 85 issued in February, 1891, gives the results of his researches into the chemical constitution of the sun. The spectra of the whole of the elements, with the exception of a few of the gaseous and a few of the excessively rare ones, have been photographed from the extreme violet to the D line, and eye observations have been used to extend the observations into the red. Solar comparisons were made with all these spectra, and the greater part of the solar lines were identified with terrestrial elements. The maps of this great work are published, together with a full analysis of the results, and from these we learn that only fifteen elements are absent from the sun's spectrum—these being antimony, arsenic, bismuth, boron, nitrogen, cesium, gold, iridium, mercury, phosphorus, ruthenium, selenium, sulphur, thallium, and praseodymium.

Eight elements are recorded as doubtful: iridium, osmium, platinum, rubidium, tantalium, thorium, tungsten, and uranium.

Of the 36 elements present, calcium is most prominent in the intensity of its lines, followed in descending order by iron, hydrogen, and sodium, potassium being the least prominent. Both silicon and carbon are present. In number the iron lines are easily first, there being more than 2,000 present; the next six are nickel, titanium, manganese, chromium, cobalt, and carbon, of which latter element 200 lines are recognised. Lead and potassium are each represented by a solitary line.

Mr. Frank McClean (*Mon. Not. R.A.S.*, vol. li., page 492) has made comparisons of the spark spectra of the metals of the gold group, and the iron group with the solar spectrum. The spectra of the gold group, as far as the photographs go, indicate many new lines not hitherto observed, and also show some curious coincidences between the air lines in the metallic spectra and lines in the solar spectrum. The photographs of these spectra were laid before the Royal Astronomical Society in November, 1891. The scale of the photographs is equal to Augström's chart, the photographs being enlarged to that scale. They extend from wave length 3800 to wave length 5750 tenth metres, or from above H to near D. The spectra of iridium, ruthenium, and rhodium are, he believes, new, and so are some others in the iron group. (*Mon. Not. R.A.S.*, vol. lii, page 22.)

M. Cornu has been investigating the extreme ultra-violet extension of the solar spectrum, and finds wave length 292 as practically the ultra-violet limit.

M. Janssen has continued his work on the oxygen spectrum, and has spent a large portion of the summer in the Alps, his object being to establish an observatory on the top of Mont Blanc to carry on his investigations. A tunnel 30 metres long has been made into the ice cap, at a distance of 12

metres below the summit, but as yet no solid rock has been found; and work has been suspended during the winter. One is compelled to admire the splendid devotion to science of M. Janssen, for although now 67 years of age, and suffering from severe lameness, he not only ventured in 1890 to the summit of Mont Blanc on a sledge dragged by twelve guides, but is contemplating a considerable stay in an observatory there, if such observatory can be founded. He will, under these conditions, continue his researches on the presence of oxygen in the spectrum of the sun, and will endeavour by photography and by eye observation to decide the question. During 1891 he has been photographing the solar spectrum when the sun is at an altitude of 4° or 5°, and finds he can in this manner get certain oxygen bands difficult to observe under other circumstances. (*Compt. Rend.*, vol. cxiii., No. 21)

Although nothing has been published by Mr. George Higgs, of Liverpool, during 1891, it is understood that he is continuing his splendid work, and completing the photographic map of the solar spectrum on which he is engaged.

At South Kensington the solar spectrum has been photographed with comparison spectra of metals and of meteorites, in connection with Professor Lockyer's long investigation of the chemical constitution of the sun. A large number of photographs have been measured, and the chemical origin of many lines traced, but no results have been published during 1891.

At Stonyhurst College Observatory, near Blackburn, a very careful systematic study of sun-spot spectra has been carried on for many years, and in 1890 and 1891 photography has been called in to assist in the investigation. Much of the work has been of an experimental kind, but important results may be expected from the able observers engaged in it.

Prof. Langley has taken charge of the new Smithsonian Institution Observatory in America, and is going to devote the 100,000 dollars voted by the United States Congress to the study of telluric and astrophysics. The well-known ability of Prof. Langley is a safe foundation on which to base hope of considerable advances in these departments.

LUNAR PHOTOGRAPHY.

The comparative nearness of the moon to the earth, the close attention it has received, and the high magnifying powers employed on it, have given us such splendid charts that we were scarcely prepared to find, as we have found in 1891, that photography applied to the moon would show details that the eye had not been able to detect. The long-continued observations of Schröter, Lohrmann, Madler, Neison, Schmidt, Webb, Nasmyth and Carpenter, and Elger, and the many beautiful drawings we owe to these and other observers, have given us a wealth of detail that is surprising even to those who are familiar with the telescopic appearance of our satellite. It seemed scarcely possible that any formation of any considerable size had remained undiscovered and unrecorded. Elger (*Obs.*, vol. iv., page 95), writing of some splendid silver prints of enlargements of the moon taken by Mr. Burnham, of the Lick Observatory, on Aug. 31st, 1891, says that "marvellous detail is shown, and leads one to hope that the camera in future may surpass our most sanguine expectations, although we may have long to wait ere it succeeds in portraying the delicate clefts and other minute details revealed

to the eye." Dr. Klein (*Sirius*, March, 1891) also very highly praised these photographs, having compared them very closely with lunar maps. Prof. L. Weinck, of the Imperial Observatory, Prague, had started to make a very much enlarged map of the moon, and Prof. Holden sent him 32 photographs of the moon taken at the Lick Observatory, showing different phases. The photographs were enlarged 10 times by Prof. Weinck, and the examination of these enlarged pictures revealed several objects not shown on the charts by Madler or Lohrmann, or on the larger chart by Schmidt. On a photograph taken Aug. 27th, 1888, a new feature in the form of a large rill (a cleft or furrow), 28 kilometres long, was discovered near the middle of the large walled plain known as Thibet. A small crater drawn on the outer wall of Thibet was proved to be inside, and a small, new crater, 4½ kilometres in diameter, was discovered near Sinus Medii. These features were shown on several of the Lick photographs, and an examination of a Melbourne photograph taken in 1873 also showed the rill, proving that, although it has not been recorded in any catalogue of rills or description of Thibet, it has certainly not been recently formed. (*Ast. Nach.* 3055.)

Prof. Weinck has also announced (*Pub. Ast. Soc. Pac.*, vol. iii., No. 17, page 285) the discovery on the photographs of a new "crater, pit, or round valley," in the region S.W. of Bode and Pallas. The presence of this is confirmed at Lick Observatory by examination of other photographs, and the negative of Sept. 22nd, 1890, shows an extensive system of rills, all of which are new, and some of which are formed of confluent craters. Prof. Weinck's new crater lies at the intersection of two of these rills.

Professor Holden announces (*Pub. Ast. Soc. Pac.*, vol. iii., No. 16, page 249) that hundreds of new features can be obtained from the Lick moon photographs by a special method of treating the negatives. A correctly-made positive copy of a moon photograph shows the details that are apparent in the negative, in correct contrast, but Mr. Barnard has made, at Professor Holden's request, positive copies with widely different exposures. If 30 seconds gave a correct positive from a certain negative, then positives were made with varying exposures of 10 secs., 20 secs., 40 secs , 50 secs., 60 secs., 70 secs., and 80 secs. In these positives the general form of all the features is preserved, but the photometric contrasts are all exaggerated, and although nothing is shown that is not on the negatives, what is there is shown in new lights. Many important discoveries have been made in this manner. Probably no feature of the moon has been so carefully examined under all illuminations as the magnificent crater Copernicus, and yet from the Lick pictures a new crater ring has been discovered of nearly the same diameter as Copernicus (that is, 56 miles), nearly touching its south-east wall, and evidently intimately connected with its ancient history. In his notes on the crater Tycho, Schmidt says that no one of the bright streaks around this crater can be traced nearer the external wall than the *exterior* boundary of the grey nimbus surrounding the crater. But the positives show more than one streak extending quite through the whole width of the nimbus and up to the wall. Probably these features have not been, and will not be, seen by the eye, owing to the great brightness of the moon preventing faint contrasts from being detected. The photographic plate can record fainter contrasts on a bright object than can be seen by the human eye. In the special treatment of the negatives these contrasts are intensified and rendered visible on the

positives. An entirely new and very powerful "engine of research" has thus been brought to the service of selenography, and in the hands of Professor Holden we may expect a very large accession to our maps of the surface of our satellite.

Dr. L. Weinck finds that 20 times enlargement is necessary to bring out all the detail on the Lick photographs, thus giving a picture of 9ft. diameter. This enlargement practically amounts to examining the moon with a magnifying power of 1000 diametres, a power that few existing telescopes will carry, and which can rarely be used on any telescope owing to atmospheric tremors. The photographs have the great advantage of not varying, whereas all attempts to draw the details on the constantly moving terminator are interfered with by alteration in the length of shadows and variations of brightness as the sun rises higher and higher above the lunar horizon. Briefly summarising the value of photography in this part of astronomical work, we find that by its aid we are enabled to study lunar details for any length of time, under unaltering illumination, with enormous magnifying powers, under such conditions that contrasts invisible to the eye at the telescope are visible on our enlargement; and all this, at any time, and in the comfort of a warm room.

It is the desire of Professor Holden at the Lick Observatory to get a pair of satisfactory negatives at the primary focus of the 33 inch for every few hours of the moon's age, so that by comparing these with the photographs obtained in future years astronomers may be able to detect any changes on the lunar surface. He has already made considerable progress in this work (*Pub. Ast. Soc. Pac.*, vol. iii., No. 14, page 62), and has also commenced making enlarged pictures in the telescope as an additional assistance in the detection of possible changes. A grant from the Smithsonian Institution has been made to the Lick Observatory to enable enlarged photographs 33 inches diameter to be taken. The Bros. Henry, at the Paris Observatory, have continued those beautiful enlargements of the moon with their 13in. refractor, samples of which were, by their kindness, introduced as illustrations to this article in last year's ANNUAL. In addition to this the new Coudé or elbow (bent) telescope at the Paris Observatory has been adapted for lunar photography. This telescope, which is of 23·6 inches aperture, and 59 feet focal length, gives a larger primary image of the moon than any telescope in the world. The image is 7·08 inches in diameter, so that an enlargement of five times will practically give a three foot disc (*Sid. Mess.*, vol x., page 295). Much greater enlargement will probably be attempted, and knowing the great skill of the Brothers Henry we may expect that the new work will be as far in advance of the present work as that is in advance of anything previously obtained.

At Arequipa, in Peru, Professor W. H. Pickering has erected a 13 inch photographic telescope, and hopes at the great height of 8,000 feet to be able to get direct enlargements of the moon up to 6 feet in diameter. The latest reports as to atmospheric conditions from this new station are extremely favourable, and there is every chance of such pictures being successfully obtained.

At Ealing the moon was photographed with the 5 foot reflector on twelve occasions in 1891, and some direct enlargements made at the telescope up to a diameter of 39 inches, but the atmospheric conditions near London are very



PHOTOGRAPH OF A METEORITE.

Taken by Dr. Max Wolf, at Heidelberg, September 7th, 1891.

unfavourable for this work. The primary image photographs show a distinct improvement on those previously obtained. The bright limb of the moon is considerably brighter than the terminator (the irregular edge between the bright and dark portions of the moon), and if correct exposure is given for the terminator the other part is greatly over-exposed. This defect is found more or less in all moon photographs, but special arrangements have been made to correct this at Ealing, a circular shutter being used with an opening of such a shape as to give the required inequality of exposure.

Some interesting moon photographs with very short exposures were made with the 13 inch photographic telescope at Cambridge during 1891, in the testing of the instrument before the chart work was commenced. Mr Seabroke, at Rugby, has been using his 15 inch mirror for lunar work. Mr. Schooling points out that Dallmeyer's new combination enables lunar photographs $\frac{7}{8}$ in. in diameter to be taken with only 2 feet distance between the lens and the plate. (*Jnl. B.A.A.*, vol. ii., page 80.)

An ingenious application of photography for the determination of the question of the existence or non-existence of an atmosphere on the moon has been suggested by Lieut. P. B. Molesworth, R.E. (*Jnl. B.A.A.*, vol ii., page 84). Observations have shown that when the moon passes in front of a star the latter disappears almost instantaneously, and does not "hang" on the edge as it would if the moon were possessed of an atmosphere of any considerable density. Lieut. Molesworth suggests that the dark limb of the moon's image should be kept stationary in the field of a telescope by properly regulating the driving clock of the instrument, and a photographic plate exposed from some time preceding to some time after an occultation. An image of an occulted star would be seen as a trail or line on the photographic plate, and any diminution of its brightness would be due to the absorption of its light by the lunar atmosphere, while a straight, even line right up to the edge would prove the absence of atmosphere. I would suggest a modification of this process by taking a series of equal exposures at regular intervals immediately preceding the occultation. The plates could then be developed together, and any variation of brightness be detected by measurement of the star's images This would abolish the risk of fogging from over-exposure to a bright sky, and also prevent any apparent variation of the star's magnitude, due to the light of the star acting over different parts of the plate that had been exposed to the moon's light for different times. Captain Abney finds that all determinations of magnitude of stars are quite unreliable from a plate that has been fogged by exposure to diffused light before or during exposure to the images of stars (*Obs*, vol. xiv., page 178), and portions of the plate would be unequally exposed and fogged if the star trail were adopted for this observation.

Photography was employed to a considerable extent during the preparations for the eclipse of the moon of November 15th, 1891, and also during the period of totality. On ordinary occasions the moon appears larger than it really is, owing to what is known as irradiation, and on this account when its bright edge occults a star it is not unusual to find that the star remains visible, apparently through the moon's limb. At eclipses this defect is of course abolished, and by ascertaining the exact time that known stars disappear or reappear, it is possible to calculate the moon's actual diameter more accurately than it can be obtained in any other way. Some time before

the eclipse of November 15th, Drs. Scheiner and Blumbach, of Potsdam, exposed four plates to the region of the sky in which the moon was situated during totality. These plates were measured by M. Renz, who gave (*Ast. Nach.* 3061) the positions of 240 stars down to the 11th magnitude, which would be occulted during the eclipse. Dr. Dollen selected 138 of these as suitable for observation, and lists of these stars, together with calculated times of disappearance and reappearance, were distributed to the observatories of the world.

During totality the moon was photographed, thirty times at Toulouse, and our times at Bordeaux. M. Rayet, in a note to the French Academy, November 23rd (*Compt. Rend.*, vol. cxiii., No. 21), gave a brief account of the photographs obtained at Bordeaux. The plates were exposed by M. Courty, in the 13 inch charting telescope, for two minutes, and this was found sufficient to give a perfect outline of the disc. M. Janssen, in discussing the note, described his work at Meudon on the same eclipse; two minutes' exposure gave the portion in shadow, but 15 minutes were required to get a picture of the eclipsed moon, showing details. He further pointed out how, by a series of photographs of the full moon and partially eclipsed moon, we can determine the varying intensity of light which penetrates the cone of shadow more accurately than in any other way. Our knowledge of the absorption of the earth's atmosphere and its refractive effect would be much increased by this determination, and it is to be hoped that photographs will be taken during future eclipses for this purpose.

At Harvard College Observatory a series of photographs was taken covering a space 30° in diameter round the eclipsed moon in order to find any satellite which it may have. From a careful examination of the plates it is believed that our satellite is itself unattended by any satellite.

Some interesting photographs of the crescent moon, also showing the dark side both near new moon and after third quarter, were obtained at Ealing in 1889 in some experiments with the 20in. reflectors used for the total solar eclipse of 1889, December 21·22. A considerable amount of detail was photographed in one minute, the principal seas and craters being easily recognisable. At Lick Observatory the dark side of the moon has recently been photographed with the 12in. refractor. Twenty seconds on a Seed plate (26 sensitometer) give a distinct image, and 40 to 70 secs. show considerable details (*Sid. Mess.*, vol. x., page 156).

PHOTOGRAPHY OF PLANETS.

Very considerable progress has been made in this department of astronomical photography during 1891.

Mr. A. Stanley Williams, of Burgess Hill, Sussex, has been examining and measuring the photographs of Jupiter taken at the Lick Observatory during 1890. A list of these photographs is given by Professor Holden in *Pub. Ast. Soc. Pac.*, vol. iii., No. 14, page 65, and Mr. Williams's results were communicated by Professor Holden to the Royal Astronomical Society in April, 1891. (*Mon. Not. R.A.S.*, vol. li., page 462.)

At Lick twelve photographs were taken in the primary focus of the 33 inch, and twenty-one plates of enlargements exposed, two images being usually taken on each plate. The enlarged images are one inch in diameter, being

enlarged 8·3 times at the telescope. From these photographs fairly accurate measures of the polar compression can be made, but it is in the great detail shown that their chief value lies. Nine belts and the red spot are shown on the photographs, and the position of the latter shows an error in the predicted position of 8·2 minutes, whereas visual observations had given 15 minutes. The latitudes of the belts on Jupiter, when measured on the photographs, give results which agree to less than 1°. The general conclusions from considerations of probable errors are "that photographs of Jupiter in their present state of perfection are equal in point of accuracy to the best micrometric measures, whilst not the least of the advantages of the former method (photography) is the power to be able to make measures at one's leisure, to repeat them if necessary, or to supplement them by measures of fresh points, so as to be able to strictly compare the positions of objects with the results obtained in previous years."

Mr. Williams has also measured three photographs of Jupiter, taken on August 19th, 1891, at Lick (*Obs.*, vol. xiv., page 362). He describes the appearance of the negative as being almost like looking at the planet itself. A comparison is made with a drawing made by Mr. Williams 10 hours—*i.e.*, practically one revolution of the planet—earlier than the photograph. Where Mr. Williams on the belt in 25° N. latitude had drawn three spots, the photograph shows six, with traces of a seventh, and many details not in the sketch. Several movements of the southern markings on the planet have evidently taken place in the 10 hours, for there are marked displacements shown between the drawing and photograph. In all, 16 or 17 spots are measurable, and correct positions can be obtained for these. The third satellite and its shadow are shown on the photograph. The satellite is seen as a clean, round spot entering on the disc, its shadow forming a black spot with an obvious fringe round it. 3 min. 40 sec. after the first photograph, the satellite is shown half-way on the disc, and during the next 2 min. 30s. the satellite passed almost completely on, and is thus shown in the last photograph.

At Ealing, with the 5 foot reflector, enlargements of Jupiter have been attempted with considerable success during 1891. Dr. Common showed a series of these photographs at the Royal Astronomical Society on November 13th, 1891 (*Mon. Not. R.A.S.*, vol. lii., page 18). The quickest hand exposure with a revolving shutter is found to be sufficient for the direct image, and 2 secs. gives all the satellites as measurable discs. Enlargements up to $\frac{1}{2}$ inch receive 3 to 6 sec., to 1 inch 8 to 10 secs., and to $1\frac{3}{4}$ inch 30 secs. The second and third satellites were photographed in 7 secs, with an image of Jupiter ·8 of an inch diameter, the egress of these satellites being traced by a series of photographs at short intervals on September 8th, September 10th, and September 15th respectively. The shadows of the satellites are round, rather diffuse black dots. Considerable detail is shown on many of the photographs, in some cases as many as nine belts being recognisable. The great red spot and a new strong red spot are also shown on several of the photographs, the axis of the new spot being sharply inclined to the belts of the planet. In all, over 80 enlargements of Jupiter were taken during 1891 at Ealing.

A curious effect obtainable with the photographs of Jupiter, taken by the Bros. Henry, of Paris, on April 21st, 1886, and reproduced in Admiral Mouchez's "Photographie Astronomique, 1887," is noted in *Nature*, vol. xliii, page 269. The eight photographs given were taken at three minutes' intervals. Placing

the earlier of two adjacent pictures in the series to the right, and the later to the left, of a stereoscope, the image of the planet appears solid, the red spot, two belts, and the irregularities of the belt being all shown. Reversing the order of the pictures gives a hollow effect. Stereoscopic pictures of the moon were made by Draper and De la Rue many years ago, and are easily obtainable, and now a stereoscopic picture of a planet is a novelty easily within reach of anyone who chooses to get the admirable little *brochure* by Admiral Mouchez.

Mr. Roberts has photographed Neptune on 16 occasions between 1890 (Dec. 9th) and 1891 (Feb. 24th), eight of the negatives showing the satellite. The image of Neptune with the exposures given (ranging from 15 min. and 3 hours) is sufficiently large to fill out the orbit of the satellite, and the movement of the satellite is too fast except when at extreme distance from the planet, hence the absence of the satellite from some of the photographs.

The position angle of the satellite from the planet is measurable on eight photographs, and the results are of great value in checking the tables of prediction. On December 12th, 1890, Neptune was in conjunction with a 9·4 magnitude star, and the photograph taken with 15 minutes shows the star, planet, and satellite together.

The planets Mercury and Venus have been photographed in full daylight with the 33in. telescope at Lick, exposure of ·13 of a second being ample for the purpose. Dr. Gill reports (*Mon. Not. R.A.S.*, vol. li., page 215) that for the purpose of checking the positions of the comparison stars used for the determinations of the places of the minor planets, Iris, Victoria and Sappho, complete photographic triangulations of the regions round these planets have been made, 218 photographs being taken for the Victoria triangulation, 282 for Sappho, 86 for Iris, and 32 for experimental purposes. From these photographs accurate positions of the stars, and therefore of the planet, will be obtained, and important results may very soon be expected from their complete measurement and computation. 270 photographs of Jupiter have also been taken at the Cape, for the purpose of determining the relative positions of the satellites, to check the tables of calculated positions, and to enable more accurate tables to be made out.

During the transit of Mercury on May 10th, 1891, thirteen good photographs were obtained by Mr. Burnham with the 40 foot horizontal telescope at Lick, and some other photographs were taken with the 12 inch telescope. All these photographs, which were obtained in a short interval between the ordinary micrometer measures, enable the exact position of Mercury to be accurately ascertained, and thus give astronomers a chance of checking their tables of the planet. The umbra or central spot was found to be 18″ in diameter, while the atmosphere of the planet caused the penumbra to appear 34″ in diameter.

The year 1891 will be remarkable as the year in which a minor planet was first discovered by photography. Dr. Max Wolf, at Heidelberg, on December 22nd, 1891, was photographing the stars in the ecliptic, when his plate showed two trails, while all the stars were sharp and round. It was obvious that the trails were due to movement of the points of light during the exposure, and both turned out to be minor planets. One was Sapientia, a known minor planet, and the other, which was entirely new, is No. 323. Several other minor planets have been discovered by Dr. Wolf since that

time by the aid of photography, but details of them must be deferred until next ANNUAL.

COMETS AND METEORITES.

During 1891 five new comets were discovered, but all were of telescopic size, and very little has been attempted in the way of photographing them. An exposure of 30 minutes was made on Wolf's comet (1891) at Ealing, but the night was hazy, and no impression was made on the plate. The comet was photographed on the evenings of September 6th and 7th, 1891, near the Pleiades, with Dr. Wolf's $5\frac{1}{4}$ inch Kranz aplanatic lens. The change of position in one day is easily seen on this plate. One other result of cometary photography has been published in 1891. The comet discovered by Brooks in 1890 was photographed with 35 minutes' exposure in May, 1890, by M. Victor Nielsen, of Copenhagen (*Obs.*, vol xiv., page 62), with a $6\frac{1}{2}$ inch object glass, the photographic focus of which was 7 millimetres outside the visual one. This same comet was photographed by M. Trepied, at Algiers, as announced in last year's ANNUAL.

Astronomical photography has taken quite a new departure during 1891, and results of considerable value will probably result. Mr. D. Booth (*Jnl. B.A.A.*, vol. i., page 234 suggested that a photographic telescope should be pointed to the known radiant point of a meteor swarm, and as the shooting stars rushed in, even if they were not able to leave separate trails, their united light at the radiant point ought to produce a nebula-like glow, the position of which could be determined with greater accuracy than the usual method allows.

Dr. Max Wolf (*Jnl. B.A.A.*, vol. i., page 439) gives an account of his first accidental photographic picture of a meteor. On April 1st, 1891, he was with Mr. Staus photographing a region of Ursa Majoris with his 5in. aplanatic lens. At 9.45 a meteor of normal brightness passed directly across the field, and the observers joked over the idea of photographing it. On developing the plate the track of the meteor was shown as a straight line about 6° in length from ϵ Ursa Majoris, as far as between 40 and 41 Draconis. The image s scarcely visible on one side of the plate, and gets broader and broader until it is sharply interrupted at the part not exposed to the sky. The sharp cutting off at the end and the general appearance convince Dr. Wolf that the line in question is not a scratch. A somewhat similar appearance is found on a plate of the Pleiades taken on October 9th, 1890, but he is doubtful whether or not this, too, is a meteor. On September 7th, 1891, Dr. Wolf was exposing two plates to the great nebula in Cygnus, using his $2\frac{1}{3}$ inch portrait lens, and the $5\frac{1}{4}$ inch Kranz lens. A meteorite again crossed the field, and on developing the photographs the trace of this body was seen on both plates, fluctuations in intensity being indicated which agreed on both. The whole trail is shown on the plate with the $2\frac{1}{3}$ inch lens, but not entirely on the plate with the $5\frac{1}{4}$ inch. A reproduction of the photograph of the complete trail is, by the great kindness of Dr. Wolf, introduced into this article.

ABBREVIATIONS OF THE TITLES OF PERIODICALS.

American Annual	*Am. Ann.*
Annals of New York Academy	*Anns. N.Y. Acad.*
Astronomy and Astro-Physics	*Ast. and Astro-Ph.*
Astronomische Nachrichter	*Ast. Nach.*
Ciel et Terre	*C. et T.*
Comptes Rendus des Séances de l'Academie des Sciences	*Compt. Rend.*
Gould's Astronomical Journal	*G. A. J.*
Himmel und Erde	*H. und E.*
International Annual	*Inter. Ann.*
Journal of the British Astronomical Association	*Jnl. B.A.A.*
Knowledge	*K.*
Monthly Notices of the Royal Astronomical Society	*Mon. Not. R.A.S.*
Observatory	*Obs.*
Photography Annual	*Phot. Ann.*
Poggendorf Annual	*Pog. Ann*
Proceedings of the Royal Institution ...	*Proc. R.I.*
Publications of the Astronomical Society of the Pacific	*Pub. Ast. Soc. Pac.*
Report of Harvard College Observatory ...	*Rep. Harv. Coll. Obs.*
Sidereal Messenger	*Sid. Mess.*



Advances in Spectroscopy in 1891.

By Captain W. de W. Abney, C.B., D.C.L., F.R.S.

THE advances made in spectroscopy by means of photography are not many, nor of great importance, but there are some which were not recorded in our last article on the subject, and which have been brought to a greater state of perfection than heretofore. The principal use that the spectroscope has been turned to is undoubtedly stellar work, as the "Nova" has occupied the attention of those astronomers who employ it for scientific purposes. The method of obtaining stellar photographic spectra, which has ordinarily been adopted, has been to throw an image of a star on the slit of the spectroscope for a certain length of exposure, and then the image has been moved slightly along the slit whilst another exposure was given, and so on, in order to have a band of sufficient width to give recognition to the different lines which might be found in it. This method is tedious, and the image had to be watched by the eye and band in order to get satisfactory results. It had some advantages, as Dr. Huggins's beautiful stellar spectra showed some years ago; but it had the disadvantage of slowness, and also that only one spectrum at a time could be impressed. Some three years ago Professor Pickering, if we mistake not, sent over to England negatives of star spectra, not one or two only, but scores being impressed on the same plate. His method of producing these was to use a thin prism in front of the object glass of his telescope, and having timed the clockwork, to allow the disc of all the stars in the field to impress their spectra as produced by this prism. The angle of the prism was naturally small, hut the spectra so obtained, when used judiciously, gave an insight into the different classes of star spectra almost at a glance—for, as several might be seen upon the same plate, they could be compared together at will.

It would be impossible to produce very satisfactory results by this plan unless the telescope were of large aperture, and very perfect definition, since the size of the star disc depends on hoth. And as on this size in its turn the definition of the lines depends, it will be seen that it would be useless to employ a small telescope even if otherwise thoroughly good.

Some of the enlargements of these spectrum photographs gave results of supreme importance, for it showed that what was apparently only one star was in some cases a double star, one revolving round the other, although it was unresolved as such by the telescope. This was shown by the fact that lines which ought to have been single were doubled, the duplication being due to the fact that the lines were shifted owing to one of the pair moving towards the observer and another away from him. Further, by taking these photographic spectra at different times, the period of rotation has been determined, since duplicated lines approached or receded from one another, according to the position of the two stars. This interesting work has been followed

up by Professor Lockyer, and we have had it applied to the investigation of the meteoric theory which he has recently brought forward. It is not in the province of a photographic annual to discuss the "pros and cons" of this theory, but only to show that photography has been of supreme utility in such investigations.

But another part of the work is deserving of mention, and that is the plan introduced by Mr. Higgs, of Liverpool, for getting rid of the grain of his photographs during enlargement, and as a novel idea it is certainly worthy of record, though only useful to and adopted by spectroscopic photographers. In making an enlargement from a small photograph we have invariably great trouble with the granularity, and the writer has often been afraid to lose details in enlargements which are evident in the original, strange as it may appear to say so. The reason is that the interspaces between the grains of deposited or reduced silver become more apparent when the enlargement is of any serious dimensions giving a fuzziness which mars the definition and renders it hard to make out fine lines. To avoid this Mr. Higgs adopted the plan of very slightly moving his negative during enlargement in a direction parallel to the lines. The movement is very small, but it is sufficient to cause the opacity of the silver grain and the transparency of the interspace to mix together, and the result is that an enlarged spectrum can be examined with the same facility, and even more so than the original negative. The photographs by Mr. Higgs are marvels of beauty, and it was for some time a wonder how he produced them. When or how the artifice was given to the world the writer is unaware, but it is now common knowledge, and the method has been adopted by astronomers in making the enlargements of the spectra already alluded to. That such enlargements are necessary when a spectrum is perhaps taken more than $\frac{1}{4}$ inch long is evident, and a microscope if used on them, would be useless owing to the granularity of the deposit. Further, in the spectra which the writer has in view, the breadth, or rather, perhaps, one should say the width, is made up of a series of narrow bands, each of them containing a spectrum of the width of the star disc. By moving such a photograph of a spectrum in the manner described, these horizontal bands merge one into the other, and the whole becomes one uniform band, with all the lines and spaces of the spectrum continuous. Such a spectrum can be enlarged up till it becomes 12 inches in length, and but a small part of its width alone need be printed.

Another application of the spectrum which the writer has made is in the determination of the value of the colour of negatives for printing purposes. Some classes of negatives are evidently totally different to others as regards colour. A most common form of deposit is that of an olive green, and it is found that this colour is not due only to a stain of the film, but to a pigmentation of the deposit itself. Negatives of this class are very deceptive in their character, and it is found that they vary very much in opacity, according to the light in which they are measured. Thus, if a red light be transmitted through them they will be found to be much less opaque than if a blue light be used. There are, of course, other classes of negatives which vary, but in different ways. This method of examination leads one to suspect that the image is not always made up of metallic silver, but rather of something which is a compound of it with organic matter.

It does not seem to be sufficiently realised at the present time that spectrum photography for the purposes of photographic research can be carried on with the most simple apparatus. It is not necessary, as has been pointed out in the pages of *Photography*, to have elaborate and very delicate instruments with which to work. It is sufficient for most purposes only to be able to have a spectrum which will give the sodium line in the orange as fairly defined. If this be obtained, almost any simple photographic research can be carried on. A single prism, a slit, and a lens of some 16in. focus, with a camera, is all that is really necessary, and sunlight, or the light of a paraffin lamp, will be sources sufficient for the object in view.

When it is a question of applying photography to spectrum purposes the case is different. In this case the apparatus should be perfect, since every error in it may mean a record of a spectrum which does not exist. Thus, if an Iceland spar prism be used, unless properly adjusted, it will give pairs of hues instead of single ones, and so we might arrive at conclusions which would be utterly false. The question of the sensitiveness of the plates to the different rays should also be examined. Thus, if the colour sensitiveness of isochromatic plates be known to a given source of light the intensity value of every spectrum at its different parts will be derived. This no doubt will some day be carried out more generally than it is, but scientific astronomers and others will have to be more of photographers than they are at present before it becomes universal. The tendency at present is to use photography as a merely mechanical adjunct to science rather than as a science in itself, it not being fully understood that results are possible which are scarcely dreamt of if it be only properly employed.

On the Progress in Meteorology in 1891,

FROM A PHOTOGRAPHIC POINT OF VIEW

By G. M. Whipple, B.Sc., F.R. Met. Soc., Superintendent of the Kew Observatory of the Royal Society.

THE British Association Committee of Meteorological Photography made a powerful appeal last year to photographers for aid in the development of their branch of scientific enquiry, and asked them for their assistance by the loan of views, photographs, prints, or lantern slides, which will go to form a good collection of meteorological photographs. This appeal received a hearty response, and already some sixty or seventy photographs have been contributed to the committee, which is under the chairmanship of Mr. Symons, F.R.S., the other members being Mr. Hopkinson, Professor Raphael Meldola, and Mr. Arthur W. Clayden, the secretary. The last-named gentleman gave an address on some of the photographs already collected before the Royal Meteorological Society at their meeting in March, 1891. Of course, the principal feature of this photography was the reproduction of cloud forms. In addition to the employment of coloured screens, orthochromatic plates and reflected light, much use has also been made of polarised light, by employing a black glass mirror in front of the lens, and so placed that its plane makes an angle of about thirty-three degrees with the axis of the lens. The discovery of this method appears to have been made independently by Dr. Riggenbach and Mr. Clayden. They had both found that the black glass mirror, having extinguished the blue light from the sky by polarising it in a particular plane, allows the light from the cloud to stand out brightly on a dark background; more especially this is the case when the cloud is situated at about ninety degrees from the sun. The dark mirror so reduces the whole brilliancy of the illumination that it renders the operation of taking pictures of cirrus much more easy than by taking them direct.

Dr. Riggenbach† has also advocated the employment of Schlippe's salts as a convenient substance wherewith to intensify plates of cloud pictures, which would otherwise be too faint to use for printing purposes or for measurement.

---

* "Meteorological Photography," an address by Arthur W. Clayden, M.A., F.R. Met. Soc.—*Quarterly Journal R. Met. Soc.*, vol. xvii., p. 142.

† "Archives des Sciences Physiques et Naturelles," T. xxiv., 1890, p. 388.

Another advantage of taking numerous cloud photographs is that it enables observers to trace the transformations which clouds undergo in a given part of the sky at intervals of a very few minutes. These changes are particularly noticeable when the central area of the weather cyclones is passing over the observer, and very little familiarity with their forms will enable him to prognosticate the nature of the changes an approaching storm is about to pass through.

Then, again, other prints show rain and snow, and some slides are the direct records of the formation of very beautiful snow crystals. Others had depicted upon them a solar halo which was quite invisible to the naked eye, but was shown on the photograph of high cirrus cloud, taken after reflection from a black glass mirror.

Lightning flashes, now so familiar to the public in their photographic forms, have come in for a good deal of attention, even black flashes being already shown several times, as well as broad and narrow ribbon ones. Rosy-pink and ruddy flashes have also been seen, but, of course, cannot be photographed with our present means. We have had a beautiful display of the Aurora Borealis, the visual appearance of which has not been photographed, although the perturbations produced in the magnetic forces of the globe have been well recorded by the magnetographs, and have excited considerable notice.

The exceptional prevalence of fog in London was accompanied by a marked absence of sunshine, and this rendered a paper on the subject of fog from Mr. F. Brodie* very acceptable. Mr. Brodie showed how much dense fog had increased in frequency in the centre of London during the last twenty years, stating that in some neighbourhoods the increase had amounted to as much as twenty per cent. The effects of lightning upon buildings have been well illustrated by preserving photographs showing the damage done to portions of buildings which have been struck by it.

Instruments for the photographic registration of meteorological phenomena do not appear to have undergone much improvement during 1891, but we are informed that the Observatory at the Cape of Good Hope is to be fitted with self-registering magnetic instruments of a well-known type, and one or two other observatories are about to record and measure variations of atmospheric electricity and other phenomena by the aid of photography.

One interesting meteorological experiment has been made by the aid of photography during the past year. † I refer to the artificial production of the phenomenon of the well-known Brocken Spectre and its registration. Optical phenomena are well known to all Swiss travellers over the pass of the Brocken Mountains. Similar spectra have also been seen in the English Lake District, and again, the spectral appearance is notably seen on the mountain of Adam's Peak, in Ceylon, and has excited much interest on the part of explorers who have witnessed it. They describe it as follows: The traveller, standing on elevated ground, with his back to the rising or the setting sun, sees depicted upon the mist which is rising from the hollow in front

* "On the Prevalence of Fog in London," by Fredk. J. Brodie, F.R.Met. Soc.—*Quarterly Journal Royal Meteorological Society*, Jan., 1892.

† "On Brocken Spectres in a London Fog," by A. W. Clayden, Proc. Royal Meteorological Society, vol. xvii., p. 209.

of him an image of a man, which is often stated to appear to be of gigantic stature, and whose head is usually seen to be surrounded by an aureole, or circular rainbow. The accounts given by persons who have seen this spectre are not very numerous, and they vary considerably, especially in the dimensions of the figure viewed in the centre of the glow. But in reality it seems to be merely the projection of the observer's shadow as thrown upon the particles of mist or fog rising up in front of him. During the dense London fogs so prevalent last season, Mr. Clayden observed the similar rare phenomenon of the Brocken Spectre and the bows which accompany it, and succeeded in distinguishing the dark rays occasionally seen in prolongation of the spectral image, or in some other way connected with it. After thinking over these points, he repeatedly tried to raise his own spectre, and eventually was able to make it out at night, projected on the fog by the light of a gas lamp. Calling to his aid the use of limelight, he made the spectre visible to others besides himself, and thus was led to try to photograph it. After a time, on the occurrence of a denser fog than usual, he attempted to make the camera photograph its own spectre, placing a hat on the top of the apparatus so as to show the dark rays in connection with its brim. Exposures of ten and fifteen minutes gave satisfactory results, and he was able to show prints from his negatives at a meeting of the Royal Meteorological Society. He measured the angular width of some shadows at the same time, and found that a faint white bow was just visible at an angular radius of 45° for its inner margin, and 52° for its outer edge. He then found that by pouring some hot water over a broom, and waving it at arm's length on the windward side, he produced a veil of dense mist, which threw a large shadow, the outlines of which were very distinct eight or ten feet distant from the light. His spectres were estimated by his friends to be 25 or 20 feet distant, and the size was gigantic in the extreme. Mr. Clayden proceeded to investigate the reason why when the spectres appeared brighter they appeared larger. He decided it was in consequence of irradiation, and he concluded that when a man looks at his own shadow on a fog he is practically looking down a hole in that fog. The walls of this hole are made of bright and therefore opaque fog, whilst the hole itself is filled with a mist which is comparatively transparent. He therefore drew the inference that the spreading out of the rays of the shadow is merely an effect of perspective, and that the over-estimate of a spectre's size and the inability of one person to see another person's spectre is a consequence of the fact that the observer looks through a wall of illuminated mist, several feet in thickness, into its dark interior. Mr. Clayden did not enter into the question of bows and glories, not having sufficiently adequate illuminating power at his command to enable him to make the experiment.

The exceptionally severe blizzard which passed over a large tract of this country to the west and south-west of London, and was about 120 miles in width, in the spring of last year, furnished our photographers—both amateur and professional—with a plentiful store of snow scenes, many of which, whilst showing the effect of snow upon vegetation, produced views of surpassing beauty, and as such have been preserved by the enterprise of the illustrated press, in many instances The same enterprise of newspaper management of the present day has furnished the public with photographic reproductions of every meteorological phenomenon of interest soon after its occurrence—whether it be an earthquake in Japan, with its hundreds of ruined

houses, or a hurricane in the West Indies, devastating harbours and piling wrecked ships on the coasts. We also have had views of the summit of Mont Blanc, with its fatal crevasses, which absorbed the intrepid pioneers of the new observatory which was designed for erection on its summit,* as well as an extensive series of photographs from the western plains of the United States, showing the devastation produced by the action of tornadoes in that locality,† and these scenes make us thankful that England is spared from such fearful visitations.

Professor Thorpe's celebrated actinometrical observations, which gave photographers their first tabulated values of the extent of the chemical power of daylight at different hours of the day and in different localities, have been largely extended by Mr. Brennand,‡ who has been taking up this subject in India, and has since his return home worked at it in this country for the past two years. He has submitted two papers to the Royal Society, which describe the result of his photometric observations of the power of sunlight, and also of diffused daylight. He finds them to be in the main confirmatory of Professor Thorpe's results, especially on the point that the chemical action of light upon iodide of silver is in all cases strictly proportional to the duration of its action.

Although not a purely photographic subject, we cannot refrain from mentioning here the reproduction by the aid of photography of the most ancient series of meteorological observations extant in this country, being a diary by the Rev. Wm. Merle, of Driby, with weather notes kept in Lincolnshire from 1337 to 1344, for seven years, and preserved in the Bodleian Library at Oxford. This old work has been printed and published by the aid of Mr. G. J. Symons, and will afford many who are desirous of seeing how closely the weather of five hundred years ago accords with that of the present day an opportunity of gratifying their desires. The systematic reproduction of cloud photographs and the consistent nomenclature of clouds were matters which were discussed at the recent International Congress of Meteorologists held at Munich, who deputed Professor Ekholm, of Upsala, and Mr. Lawrence Rotch, of the Blue Hill Observatory, Mass., U.S.A., to report especially upon the matter. The English method of determining the height of clouds photographically and observing their drift has been described and illustrated by General Strachey and the author of this paper before the Royal Society, but does not appear to have been adopted elsewhere, although Mr. Rotch has employed a photographic method closely resembling it at his own observatory.

* *La Nature*, 5th September, 1891.

† *La Nature*, 5th September, 1891, p. 221.

‡ "Proc. Royal Society," vol. xlix., pp. 4, 255. Brennand, W., "Photometric Observations of the Sun and Sky."

Photographic Optics, 1891.

By Chapman Jones, F.I.C., F.C.S.

When a paper has been reprinted in several journals, the reference to the original paper or the official publication of it is given first, and the other references are added for the convenience of those who may happen to have greater facilities for looking up the reprint than the original.

No history of photographic optics for the past year would be complete without a reference to Joseph Petzval, who died on the 15th (given also as 17th) of September, in the eighty-seventh year of his age. As soon as photography was shown to be practically possible, especially in its application to portraiture, Petzval, who was professor of mathematics in Vienna, applied himself to the problem of the construction of lenses capable of giving images of great brilliancy without sacrificing fineness of definition. The difficulty was to cure the aberrations of lenses without reducing their apertures, and he succeeded so well in this that the portrait lens founded upon his calculations, and first issued by Voigtlander in 1841, is, after fifty years, still entitled to be spoken of as *the* portrait lens. The other practical results of Petzval's work in connection with photography are of only secondary importance.

PHOTOGRAPHIC OBJECTIVES.

The only new lens that we have to record is a "telescopic photographic lens," constructed by Mr. T. R. Dallmeyer, and described by him at the Camera Club (*Cam. Club Jnl.*, vi., 10; *Brit. Jnl.*, xxxviii., 801; xxxix., 22; *Photo. News*, xxxvi., 4). The performance of this lens was shown to several gentlemen before its construction was publicly explained, and preliminary notices will be found in the *Photo. News*, xxxv., 713; and the *Brit. Jnl.*, xxxviii, 657. For other references see *Photography* iii., 818, and *Year Book*, 1892, 89. The especial object of the instrument is to give images of distant objects upon a large scale, such as would be given by lenses of long focal lengths, but without the otherwise great distance necessary between the lens and the sensitive plate, and the following table (*Photo News*, xxxv., 6) shows to what extent this has been accomplished by a lens with a front combination of 2¾ inches diameter. The other details of construction of this particular lens are not given. The third column may be taken as representing the camera extension required if an ordinary lens were employed to give the image of the same size.

Size of Plate.	Extension of Camera required from Flange.	Corresponding foci.	Rapidity at full Aperture.
	Inches.	Inches.	
$4\frac{1}{4} \times 3\frac{1}{4}$	$6\frac{1}{2}$	25	$f/9$
5×4	8	30	$f/11$
$6\frac{1}{2} \times 4\frac{3}{4}$	$10\frac{1}{2}$	$37\frac{1}{2}$	$f/13$
$8\frac{1}{2} \times 6\frac{1}{2}$	13	42	$f/15$
10×8	$15\frac{1}{2}$	50	$f/18$
12×10	18	60	$f/22$
	36	120	$f/40$

The instrument consists of a positive or image-forming lens in front, with a negative or diverging lens of short focal length, as compared with the other, at the back of the mount. Focussing is not done as usual by altering the distance between the lens and the plate, but by adjusting the distance between the two components of the lens. As shown in the table above, a lens of this form can be focussed with the plate at any distance from it above a small minimum, the interval between the lens and plate determining the the size of the image. As the actual aperture remains constant, the rapidity diminishes as the scale of the image increases. Two views of a church about half-a-mile distant, one taken with the new lens, and the other with a lens of 13 inches focal length, are given in *Photo. News* xxxvi., 5. Mr. Traill Taylor has drawn attention to an article of his, published in 1873 (*Brit. Jnl.* xx., 444), wherein he suggested the getting of "enlarged views by one operation," by the use of lenses in which the optical centre is at a considerable distance outside the lens. He states in this article that he has used opera glasses for this purpose, especially one with three combinations in it, each triple and achromatic, the central lens being a biconcave negative, and the eye lens a plano-concave negative.

Dr. Miethe and Dr. Steinheil (*Photo Correspondenz*, 1891, 561) have also been at work upon tele-photographic objectives. Dr. Miethe is stated to have applied for a patent in Germany on October 18th. [Dallmeyer applied for an English patent (*Brit. Jnl.* xxxviii., 657 and 651) on October 2nd.] In an article describing his instrument (*Photo. Wochenblatt* xvii , 373, *Photo. Mittheilungen* xxviii., 267), Dr. Miethe gives a view of Potsdam taken at a distance of 2,480 metres, and with a camera extension of 28 centimetres. He also states that with a camera extension of 35 centimetres he can get an image as large as would be given by a lens of 560 centimetres focal length. Concerning the claims of Mr. Dallmeyer and Dr. Miethe, a correspondence has taken place in the *British Journal* (xxxviii., 702, 718, 733, 750, 766, 782), from which we gather that Mr. Dallmeyer's priority is not disputed, but that Dr. Miethe independently constructed an instrument on the same principles.

Mr. W. Wray informs us that he is extending his series of hand camera lenses up to foci of 10 to 12 inches. The higher members of the series are not intended for use on hand cameras, but they are characterised by compactness of form and the other advantages of the lower members of the series.

The new objectives described in last year's ANNUAL (page 140) are steadily making their way. The Zeiss lenses can scarcely be said to be fairly on the

market at present, but so far the demand has exceeded the supply. The Zeiss firm of Jena (*British Journal Almanac*, 1892, 1,116) have made arrangements with the following licensees, who will make lenses as described in the catalogues published by Zeiss; Voigtlander, of Brunswick; Karl Fritsch, of Vienna; E. Suter, of Basle; F. Koristka, of Milan; and Bausch and Lomb, of Rochester, New York. These lenses have met with much approbation during the year. They have been found, for similar apertures, to give better definition and a more even illumination at the edges of the plate than we have hitherto been accustomed to, and we are informed that, in the opinion of some who have used them, the more rapid series will allow of a reduction of the exposure by about one-third, when compared under equal conditions of aperture and focal length with ordinary English lens. We reproduce this impression, though doubtless it needs qualification. By the kindness of Mr. C. Baker, who is agent for the lenses made by Zeiss, and of Mr. Gotz, the agent for Suter, the writer has been enabled to examine several samples of these lenses, and can confirm the advantages in evenness of illumination and marginal definition claimed for them. But those examples of the slowest series, stated to cover an angle of 104°, that he has examined, have not proved so satisfactory as the others. All the lenses are characterised by having their combinations larger than their largest apertures, so that the oblique pencils are not interfered with and reduced by the mount to anything like the same extent as is the case with the ordinary pattern of rapid doublet.

The Gundlach Optical Company, Rochester, N.Y., advertise rapid doublets in which the combinations are each a cemented triplet, as described in last year's ANNUAL (p. 142, see also *Wilson's Photo. Magazine* xxviii., 417). They state that the combinations in any one objective are of such different focal lengths that, by using the lens entire and the combinations separately, one gets focal lengths in the proportions of two to three and four. Our attempt to get further details of these lenses has not been successful. The Company issues a series of rapid and a series of wide-angle lenses constructed upon these principles.

LENS MOUNTS, &c.

Ernst Gundlach, of Rochester, N.Y. (patent specification No. 19488, A.D. 1890; reprinted in part and without the drawings *Brit. Jnl* xxxviii, 90; *Photo. News* xxxv., 113), describes how that when a doublet lens is used with a large aperture and including a small angle of field, as in portraiture, it is desirable to have a greater separation between the combinations than when the lens is used with a comparatively small diaphragm to include a wider angle of field. That, in fact, it is advantageous to regulate the distance between the combinations according to the aperture employed. In other cases also it is desirable to be able to adjust the comparative positions of the combinations; as, for example, in taking the portrait of a sitting figure, when the image of the nearer parts of the figure falls upon the edge of the plate it is well to bring the lenses nearer together. The inventor describes a mount with an iris diaphragm, in which the combinations are carried in separate sliding tubes, and these tubes by an arrangement of racks are caused to approach each other as the diaphragm is reduced in size. The position of the combinations



Negative by A. Swan Watson, Edinburgh.

AN INTERESTED SITTER.

Specimen of Half-tone Engraving by Angerer & Goschl, Vienna

is thus automatically regulated. Many variations are described. Thus, one lens only instead of both may be moved. Non-automatic devices may be employed, such as additional tubes to screw on, interchangeable tubes, sliding tubes, &c., and the application of the principle to single lenses is described. The editor of the *British Journal* (xxxviii., 91) remarks that Grubb's single lenses were generally made so that the position of the diaphragm was adjustable, and that he himself in 1885 advocated a sliding adjustment of the combinations of a doublet and exhibited a lens provided with this convenience.

Messrs. Taylor, Taylor & Hobson report that they have during the year adopted the system proposed some time since by Mr. W. Taylor of providing that all lenses fitting the same flange shall screw home with their diaphragm indices in one uniform convenient position, and that they have also extended this arrangement to standard adapters which will carry any lens in a flange one size larger than its own. They have effected this by the use of limit gauges, which confine the error in the size of any screw within the one-thousandth of an inch, and keep it always on that side of the normal screw which secures free interchangeability.

In view of the adoption of the photo-telescopic objective, we must refer here to the character of the mount, as it differs from that of any previously known lens that we are acquainted with. The mount is, of necessity, long, to allow of the required separation of the lenses, and as focussing is done by adjusting the distance between them, one of the lenses is carried on an inner sliding tube, moved by a rack and pinion. As the focussing must be done at the lens, there will be a little difficulty when a long extension of the camera is desired, but doubtless this difficulty will be surmounted when it actually presents itself.

TESTING LENSES.

The Kew Committee of the Royal Society have issued a notice (*Photography* iii., 251; *Photo. News* xxxv., 292) to the effect that they are prepared (since May 1st last) to receive photographic objectives at Kew Observatory for testing them and certifying of their performance. Class A test is done for 10s. 6d., and includes the following: "Determination of the length of equivalent focus. Size of effective aperture with every stop in terms of focal length. Angle of field of view, and size of plate effectively illuminated. Number of external reflecting surfaces. Coincidence of visual and chemical foci. Presence of flare spot. Workmanship of surfaces, structure, and degree of transparency of glass. Centring in mount. Defining power. Relative quality of illumination in different parts of field. Amount of astigmatism or optical distortion." Class B test is done for 2s. 6d., and includes the following: "Determination of the length of equivalent focus. Size of effective aperture, with largest stop. Angle of field of view. Size of plate effectively illuminated. Coincidence of visual and chemical foci."

A lecture on "The Measurement of Lenses" has been delivered by Professor Silvanus P. Thompson at the Society of Arts. (*Jnl. Soc. Arts* xl., 22; *Brit. Jnl.* xxxviii. 760, *et sec.*). Professor Thompson says that there are eighteen "things which might be made the subject of measurement with respect to a lens or combination of lenses," and these he enumerates as follows:—1. Diameter or linear aperture. 2. Thickness or length from pole to

pole. 3. Focal power, or its reciprocal, the focal length. 4. Position of principal focal planes. 5. Position of optical centres ("principal points" of Gauss). 6. Angular aperture. 7. Chromatic aberration. 8. Spherical aberrations, lateral and longitudinal. 9. Chromatic difference of the spherical aberration. 10. Loss of light by reflection from surface. 11. Absorption of light in transmission. 12. Illumination of field, central and marginal. 13. Complaneity of focus (included in 7 and 8). 14. Degree of distortion of image (rectilinearity). 15. Cylindricity, or degree of astigmatism, including angle of axis of cylindricity. 16. Accuracy of centring. 17. Definition in margin of field (involved in 7, 8 and 16). 18. Refractive indices of materials. Three only of these are dealt with in the paper, namely, the focal power of lenses, and the positions of their focal planes and principal points. The author divides the methods of focometry into six groups, namely:—1. Methods of direct focal search. 2. Methods of magnification. 3. Methods of unit magnification. 4. Methods of approximate unit magnification. 5. Methods of approximate interior unit magnification. 6. Methods of obliquity of rays. He then describes a method of focometry which he has devised, in which direct methods of measurement of lengths only are used. "The method consists in the direct determination, *firstly*, of the two principal foci by placing a transparent micrometric screen at each; and, *secondly*, when these have been found, [of] the two symmetric points by moving the two screens by a double screw motion through equal distances until each is the image of the other." The focal length and distance between the Gauss points are given by simple subtraction of scale readings. The instrument and the manner of using it are described, and a number of illustrative measurements are given. At the close of the paper two spherometers are described which give readings directly, or nearly so, in dioptries.

In a short article on "The Dioptric System," Mr. G. R. Baker (*Brit. Jnl.* xxxviii., 147) advocates the use of this system by photographers and others who have occasion to experiment with lenses. The system is used by oculists and opticians, and consists, in short, of the use of the focal *power* instead of the focal *length*, the one being the reciprocal of the other. The unit adopted is a lens of a focal length of one metre, and this is stated as having a power of one dioptrie. The power of a lens increases as its focal length decreases, so that a lens of a focal length of half a metre has a power equal to two dioptries, and a lens with a focal length of a quarter of a metre has a power of four dioptries, and so on. Mr. Baker gives examples of the methods of working on this system.

STANDARDS.

The committee of the Photographic Society of Great Britain referred to in last year's ANNUAL (p. 146) has made its report, and the council of the Society has published this report (*Jrl. of Photo. Soc.*, N.S., xv., 142; *Photography* iii., 313; *Photo. News* xxxv., 370; *Brit. Jnl.* xxxviii., 310), preceding it with the statement that as the Brussels Congress was shortly to meet, it would be premature to come to any definite decision until after that event. The committee recommend that flanges for lens screws, 1in., 1¼in., 1¾in., and 2¼in. diameter, with 24 threads to the inch, be added to the previous series, that each flange or adapter shall have a mark indicating its top, so that when

the lens is screwed home the slot for diaphragms or the index of an iris diaphragm shall be uppermost, and that the relation of focal length to aperture be marked on each diaphragm, in addition to its rapidity* ratio.

The Convention Committee have added to their report of last year (ANNUAL 146) one extra size for lens mounts and flanges, viz., 2¼in. with 24 threads to the inch. (*Photography* iii., Convention Sup. p. 9, gives full report, amendment only is given in *Brit. Jnl.* xxxviii., 457.) The report was adopted by the Convention (see also *Photo. News* xxxv., 507).

The Brussels Congress met in August. An account of the work done at Paris the year before is given by Mr. C. H. Bothamley (*Photography* iii, 422). Particulars concerning the Brussels meeting will be found in *Brit. Jnl.* xxxviii., 459, 566, 582, but the report is not yet published.

THE USE OF LENSES AND METHODS OF FOCUSSING.

DEPTH OF DEFINITION.—In a paper entitled "An Index of Definition for Lenses; or, what Stop shall I Use?" Mr. F. B. Taylor (*Year Book* 1892, 106) describes his method of getting the index numbers, which he gives in the following table:—

Focal length in inches.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Definition Index in yards.	3	12	27	48	75	108	147	192	243	300	363	432	507	588	675

The index number, corresponding to the focal length of the lens employed, is divided by the distance of the nearest object in yards, and this gives the denominator of the fraction, f/4, f/8, &c., that expresses the largest stop that will give satisfactory sharpness. If focussing can be done on an object at twice the distance of the nearest object, instead of on the distance itself, a stop of twice the ndicated diameter may be used. If the negative is to be enlarged, a smailer stop is desirable. Mr. Taylor suggests that the index number be engraved on the lens mount.

A few more contributions have been made to the old "diffusion of focus" controversy (ANNUAL 1891, 152) by Mr. W. K. Burton, Mr. T. R. Dallmeyer, and Mr. W. E. Debenham (*Photo. News* xxxv., 545, 657, 682, 710). At page 545 Mr. Burton gives another diagram to represent the effect of spherical aberration.

SUNDRY MATTERS CONCERNING LENSES, &c.—In a valuable article "On the Use of Small Stops," Mr. W. H. Wheeler (*Photo. News*, xxxv., 746, 762) combats the idea that small stops should be avoided, and points out that it is an erroneous practice to provide stops of uniform rapidities for lenses of all focal lengths. He says that if f/16 were a desirable aperture when using a half-plate, a lens of proportional focal length for a 12 x 10 plate would require an f/64, and for a 24 x 18 plate an f/256 stop, according to theory. He suggests that one size smaller stop should be added to each larger size of,

* It would be more correct to call this the *exposure* ratio.

at any rate, non-aplanatic lenses, and says that it is a convenient practical compromise to use a stop of about the same actual diameter for each size, all other circumstances being equal. For a *small* stop f/32, f/64, and f/128 might be used for the three sizes of plates above stated. Mr. Wheeler has nsed, with advantage, on a still larger plate, an f/216 diaphragm, and on a 30 x 25 plate an f/120 stop. The prejudicial effects of diffraction are practically negligible till the intensity falls below about f/200 for central pencils, and still less for oblique pencils. The advantages of small stops for copying, "even with the finest aplanatic lenses," are pointed out, and also that stray light needs to be more carefully guarded against when exposure is prolonged by their use.

Mr. Lyonel Clark (*Cam. Club Jnl.*, v., 68; *Brit. Jnl.*, xxxviii., 359), in a paper on "The Use of Uncorrected Lenses in Photography," gives the results of some experiments as to the covering power of some combinations of spectacle lenses. The author finds that the nse of a smaller stop for exposnre than for focussing gets rid, so far as he could see, of the want of coincidence between the chemical and visual foci. Mr. W. H. Wheeler (*Year Book*, 1892, 33) states that one combination out of a wide angle lens will give a flatter field and better marginal definition generally than an ordinary rapid doublet of the same focal length when it is stopped down to the same intensity. He recommends such a single lens, under certain circumstances, for architectural work, and points ont that the cnrvilinear distortion may be mitigated by raising the lens to the top of the plate, and nsing the swing back to cnre the convergence of the perpendiculars. The *curvature*, which, of course, remains, is so slight as to be practically imperceptible.

FOCUSSING EYE-PIECES.

Dr. Eder (*Photo. Correspondenz*, 1891, 361) describes an eye-piece magnifying about 20 diameters, specially constructed for testing objectives. It is carried in a tube seven inches long, and has two achromatic combinations at one end, which are nsed in conjunction with a Huyghenian eye-piece.

Mr. H. M. Hastings (*Patent Specificatcn* No. 6,239, A.D. 1890; partially reprinted, *Brit. Jnl.*, xxxviii., 219; *Photo. News*, xxxv., 253) describes an "apparatus for ascertaining the distance of any object for photographic purposes." A lens is carried at one end of a telescopic body, and throws an image of the object upon a translucent disc fixed within a Huygbenian eye-piece. The eye-piece is carried by an inner sliding tube, which also carries an index working over a scale to show the distance of the object focnssed. As an alternative apparatus, the use of an ordinary telescope or opera-glass is described, a sufficient length of draw and a scale being provided. In this case no translucent screen is necessary.

THE OPTICAL LANTERN.

Mr. Traill Taylor (*Cam. Club Jnl.*, v., 117; *Brit. Jnl.*, xxxviii., 374; *Photo. News*, xxxv., 442, 459), in a paper on "The Optics of the Lantern," recommends the use of a triple condenser, in which the first two lenses are mounted as closely as possible, and serve to collect the light, while the third

or condensing element is variable according to the projecting lens employed. For an objective of short focal length, he says that he prefers the form introduced by J. H. Dallmeyer, in which the elements of the back combination are separated so far as to impair the image that would be given in a camera, and lays special stress upon the desirability of flatness of field. A condenser constructed according to the formula of Mr. Traill Taylor was shown by Mr. Freshwater (*Brit. Jnl.*, xxxviii., 716; *Photo. News*, xxxv., 774) at the London and Provincial Association. In order to allow of the utilisation of the full amount of light without the disadvantage of throwing the slide out of focus by the adjustment, the condenser and radiant are constructed so that they may be adjusted bodily as regards their position from the slide.

Mr. E. M. Nelson (*Brit. Jnl.*, xxxviii. 806, 821), in a communication to the Lantern Society, describes how to find the focal points of condensers, and gives methods for computing their most advantageous forms.

Messrs. Perken, Son & Rayment have introduced a "projector" for sketching by aid of the optical lantern. It consists of a reflector for attachment to the front lens of the lantern so that the image is thrown on to a horizontal table below.



A Record of Photo-mechanical Printing during 1891.

Collated by T. Bolas, F.C.S., F.I.C.

Increasing the Sensitiveness of Bitumen.—It has long been known that ordinary sensitive bitumens contain sulphur, although there has been some question as to whether this element was an accidental impurity or an essential constituent of the sensitive material. Recent investigations, in which it has been shown that certain non-sensitive pitches and resins when heated with sulphur appear to unite with this element and give sensitive compounds, go far to indicate that sulphur is an integral constituent of sensitive bitumen. Further confirmation of this view is afforded by the fact (a discovery of M. Valenta) that many—indeed, most—natural sensitive bitumens are rendered more sensitive by reaction with more sulphur. M. Valenta's method of increasing the sensitiveness of bitumen is then one of the most important advances of the year, as it will tend to bring the bitumen method more into the range of practical every-day work. To further sulphurise bitumen, M. Valenta dissolves 10 grammes of sulphur (roll sulphur is better than flower of sulphur as containing less of the insoluble variety) in a sufficient quantity of bisulphide of carbon (250 grammes is a convenient quantity, although considerably less will answer the purpose). To the solution of sulphur in bisulphide of carbon 100 grammes of powdered Syrian asphaltum is now added, and the whole is agitated in a bottle till the bitumen is dissolved. The solution is now filtered into an evaporating basin or an ordinary flat dish, and the bisulphide of carbon is allowed to evaporate; but as the vapour of bisulphide of carbon is dangerously inflammable, all this should be done out of doors, or, at any rate, not in the neighbourhood of a fire. The dry residue is now heated in an air or oil bath to 180° Centigrade for about five hours, during which time sulphuretted hydrogen escapes, and the asphaltum forms a glistening mass. This is now dissolved in benzole and used in the ordinary way. It is well to avoid considerable exposure to air during the heating of the bitumen with the sulphur, and at the same time it is desirable to allow facilities for the escape of the sulphuretted hydrogen. A satisfactory arrangement consists of a small flat-bottomed flask of such a size that the bitumen forms a layer about $\frac{3}{8}$ of an inch thick, the mouth of the flask being loosely covered. As an oil bath a small cast-iron saucepan answers well, and the thermometer should be in the

oil at about the same depth as the layer of bitumen. The accompanying sketch represents the arrangement.



Moulding or Electrotyping from the Gelatino-bromide Plate — Mr. H. Sutton's Experiments. — At the Camera Club Conference held at the rooms of the Society of Arts in April, 1891, Mr. H. Sutton made reference to his experiments in the way of moulding direct from such relief as is obtainable on the gelatino-bromide plate, and as the notion seemed to be new to several persons present it may be well to indicate the conditions under which such a method may perhaps compete with other methods in common use. This method, which was rather exhaustively experimented upon by Mr. J. W. Swan, thirteen or fourteen years ago, and which he dealt with in his patent specification No. 2,969, of 1879, has advantages and disadvantages analogous to those of the swelled gelatine process with bichromated gelatine, one principal disadvantage being the rounded contour of the lines, the consequence being that the impression is not definite in its outline and the character of the prints is liable to vary very much as the printing progresses. Moreover, such blocks depend far more on the skill of the printer for the result, than is the case with blocks obtained by the processes more usually adopted. When a plate of metal is prepared for etching it is an easy and inexpensive operation to make it flat and equal in thickness, but to flatten an electrotype, especially when taken from the gelatine, offers considerable difficulties. Moreover, the etching is ordinarily a much easier, quicker, and more certain operation than electrotyping; at any rate, when the electrotype has to be made from a gelatine original. Again, the swelled gelatine processes tend to give rather low relief in the lines; and the specimens shown at the Camera Club Conference, where Mr. Sutton endeavoured to revive interest in direct moulding from the gelatine, hardly served to awake enthusiasm, excepting among some who appeared to think the process to be very much easier, quicker, and economical in execution than those commonly in use. Those interested in etching may refer back to the note on "Electric Etching" (the reverse of electrotyping), in last year's PHOTOGRAPHY ANNUAL, p. 161. Also article in *Photography* for 1890, p. 825.

Advance in Etched Typographic Blocks.—Etching from the solid and level, in one form or other, is the method of the day for making printing blocks, and until this practice became general printers would have little to do with photographic process blocks in tone; at the same time it must be remembered that when once a rigid block on a firm basis is obtained,

the production of fairly good and approximately level electrotype reproductions is comparatively easy, as a wax mould is made by pressure, the electrotype shell of copper is deposited on this, and the wax is removed without straining the shell, by the expedient of melting off the wax with hot water. Two advances are to be mentioned in relation to etched blocks, the first process of the two mentioned, being applicable to the delicate cross-line work by means of which tints are shown in the ordinary style of block from half-tone subjects.

M. M. Lumière's Reversed Albumen Process.—This, unlike the ordinary albumen process on zinc, requires a positive as original; the ink resist ultimately remaining on those parts of the zinc plate protected from the light. The following solution is the sensitive albumen used:—

Water	1,000 parts.
White of egg	100 ,,
Ammonium bichromate	3 ,,

The mixture should be well beaten, filtered, and then spread on polished zinc which has been cleaned in the ordinary way; the excess of sensitive albumen being removed by the use of the whirling table. When dry the exposure is made in a printing frame, and then the next step is to cover the plate with a thin and uniform layer of printing ink which has been thinned by means of "middle" lithographic varnish. The plate should now appear merely grey, and show no trace of the image. For applying the ink a good roller is most convenient, although other methods of inking may be adopted. Immersion in slightly warm water now serves to soften the unexposed parts of the albumen, and if the action of the water is assisted by very gentle friction with a tuft of cotton wool or a soft brush we ultimately obtain a negative image, and so far the process is practically the same as the ordinary direct albumen process on zinc. The plate is next immersed for ten or fifteen minutes in a weak solution of perchloride of iron—one ounce of the salt in 20 or 30 ounces of water answering very well, and while in this bath it should be kept constantly moving; it is, however, important to take care that this bath does not etch the plate to an appreciable depth, but only serves to roughen those parts not covered by the albumen, and if the zinc is of a quality to etch easily, a much weaker bath and shorter period must be allowed. The plate being once more washed and dried, is heated to about 50° Centigrade, and the whole surface is once more thinly inked as before with printer's ink thinned by medium or "middle" lithographic varnish. The ink now covers the plate uniformly as before; but by rolling with a clean roller, it will be found that the ink is gradually removed from the smooth albumen surface, although it still covers those parts of the zinc which were roughened by the perchloride of iron solution. Gentle friction with a tuft of wool charged with strong ammonia now rapidly removes the albumen image and leaves the positive image on the zinc; this image being the reverse of the first. The remaining treatment of the plate is by the usual methods; whether it is to be etched in relief or printed from by the zincographic method.

Soda or potash may be used to clean off the albumen image, but are generally less satisfactory than ammonia, as the fatty ink on the zinc is liable to be attacked. A solution of borax is less detergent, and may be used with advantage in some cases.

Winterhoff's Method for Glass.—A thick glass plate is first coated with a film of sensitive bitumen, and when the film is dry, a fatty impression is put down on it, after the manner of a transfer. This impression may be a print from a negative on ordinary photo-lithographic paper. The transferred print on the sensitive surface is now dusted over with metallic powder so as to make the ink opaque. Exposure is next made for a sufficiently long time to make the bitumen insoluble, and the development is, as usual, with turpentine, or mixed turpentine and benzole. The plate is now etched to the required depth with hydrofluoric acid. Printing plates of glass (typographic) are not much used in this country, but if properly mounted on metal there is no fear of breakage, and the plates are almost everlasting as regards wear.

The Primuline Heat discharge Process.—The primuline process of printing which came into prominent notice recently, has been, during the year 1892, supplemented by a modification made by Messrs. Foxlee and Bolas (patent No. 17,694 of 1891), in which a heated photo-mechanical or other block is used, instead of exposure to light in the printing frame, for decomposing the diazo compound in forming the image, thus opening the way to a possible extensive application of photo-mechanical printing to the textile industries. The action of the hot stamp is so instantaneous that several impressions can be made in a second. Radiant heat may be used acting through a stencil for obtaining designs on the diazotised fabric.

Max Jaffé's Method of Reproducing Old or Battered Intaglio Plates.—It is quite a common thing for an old intaglio plate to be so damaged that no satisfactory impression can be obtained, and yet, in spite of this, the device may be perfect, or nearly so. In such a case Herr Jaffé fills in the whole of the device with a white powder, which may be whiting or French chalk, a little water being mixed with it to give it a convenient consistency. The superfluous powder being now carefully brushed away, so as to leave the lines white, the plate is photographed, and the resulting positive, or a negative from it, may be employed through the medium of any heliographic process, to reproduce the plate.

Amman's Method of Graining an Ordinary Negative.—Any clear or vigorous negative may be grained by the method of Herr Amman, which substantially consists in coating the negative with a dusting-on ground, exposing under a lined or grained screen, and then dusting on fine plumbago. The negative is first coated with plain collodion, and when this is dry the dusting solution (photogene) is poured on, the excess is drained off, and the plate is dried at a temperature of about 130° F. A photogene mixture, made as follows, answers very well :—

Water	50 parts.
Sugar	5 ,,
Gum or dextrine	5 ,,
Bichromate of ammonia	2 ,,

The sensitive surface is now exposed under a lined screen in an ordinary printing frame, about one minute in sunlight being sufficient in most cases. The plate being now taken into a dimly-lighted room, is dusted by means of

a large camel's-hair brush with fine black lead, which takes or adheres to the protected parts as the film absorbs water from the air. When the grain is properly developed, the plate is allowed to soak in a very weak solution of caustic potash (one part in 50 or 60 of water) till the bichromate is eliminated. It is now merely necessary to rinse, dry, and varnish the negative.

Ruled Screens.—Mr. W. B. Bolton writes on this subject in the *British Journal of Photography*, and after having pointed out the difficulty of ruling an accurate screen with ink on a sheet of paper, and then obtaining a reduced negative of this, he describes a kind of optical ruling on the sensitive plate itself, a system for which a strip of tinfoil, perforated with a row of minute holes, is drawn over the plate in a kind of printing frame, a row of parallel lines of exposure being the result, and a good ruled screen is obtained on development.

The perforated strip of tinfoil may be obtained by laying a strip of tinfoil on a fine file, and then drawing the back of a knife over in a straight line, or, better still, by means of a small milling wheel run once over the tinfoil and guided by a straight edge. Mr. Bolton's ruling apparatus, for use with the tinfoil strip, consists of a long, shallow trough, like a printer's galley, and the sensitive plate is set in a recess or rebate in the bottom, and the tinfoil strip, mounted on a sheet of glass, otherwise covered by black paper, is allowed to slide slowly over the glass as the whole is exposed to daylight. Such an obvious precaution as protecting the tinfoil strip from friction scarcely needs mentioning, but some other precautionary suggestions will be found in Mr. Bolton's second article on the subject, in the *British Journal of Photography* for 1891, p. 116-117. When a screen of cross lines is required, the sensitive plate can be turned at right angles to its original position and another exposure made, or a cross ruled screen can be made by subsequent reproduction by contact or in the camera; a double exposure being, of course, made. One other point may be mentioned here, namely, that with a tinfoil strip of given pitch, say 80 dots to the inch, finer screens may be made by setting the strip obliquely on the glass plate that slides over the sensitive surface. Another plan of carrying out Mr. Bolton's idea, would be to drill a number of small holes in a long strip of sheet metal, to set this in the gap of a partly opened window. All extraneous light being now blocked out and a camera being set up in the room, the holes should be focussed on the top edge, and by a simple arrangement a sensitive plate made to slide down in the camera so that the image of each hole shall rule a line on the sensitive surface. Probably, by some such method as this, carefully performed, the best possible screens could be made.

Mr. Warnerke on Collotype Printing.—The demonstration of the "Autocopyist" method of collotype, given by Mr. Warnerke towards the end of 1890 at the London and Provincial Association, and again with some modifications in 1891 at a meeting of the Photographic Society of Great Britain, has attracted some attention to collotype printing from separate loose films. Instructions are sent out with the apparatus, and substantially the process is as follows:—The basis is ordinary vegetable parchment coated with plain gelatine, and this is sensitised by soaking for about three minutes in a three per cent. solution of bichromate of potash. When dry the flexible material is exposed under a reversed negative for about as long as would be required to make a print on ordinary

albumenised paper, after which the back of the vegetable parchment is exposed to light for about five minutes to harden the layer of sensitive gelatine next to the support. The bichromate of potash is next soaked out by immersion in water for about four hours, after which the film is squeegeed to a glass plate, and "etched" by being covered with the following solution :—

Glycerine	.. ..	70 parts.
Water	.. ..	13 ,,
Ammonia	.. ..	3 ,,

This should be allowed to partly dry on the film, or rather it soaks in and swells the gelatine, and sometimes it is well to allow several hours for this. The flexible surface is now mounted, exposed side up, on a padded wooden block surrounded by a clamping frame, which latter holds down the edges of the flexible sheet, and it is now inked and printed after the manner of an ordinary collotype plate. A common letter copying press answers quite well for prints up to half-plate size.



Artistic Aspect of Photography during the year 1891.

By Rev. F. C. Lambert, M.A.

READERS of this epoch-making yearly volume will naturally look for some notice of the art side of photography during the past year. It has been said, with a touch of humour, and also with a semblance of truth, that if they look for art in contemporary photography they will certainly look in vain. This is, like most other extreme statements, altogether too sweeping to be of permanent value. And as this volume is written and compiled, not only for present, but also for future interest, it behoves those who contribute to its pages to deal with general average conditions rather than individual instances.

Thus, in taking a broad and general glance at the pictorial side of photography during the last year (1891), one's thoughts naturally recur to the general impression gathered from the "show" that most, if not all, of us have been trained to regard as *the* show of the year, viz., the yearly exhibition of the parent society in their Pall Mall gallery.

Opinion is practically unanimous in saying that this year's gathering of exhibits is chiefly remarkable for want of any special interest.

As regards processes, platinotype holds its ground, and shows a slight increase of last year's tendency towards the so-called sepia tones. Roughness of paper is adhered to by past workers on that particular "fancy," with perhaps some slight increase of followers. Pinhole pictures make little or no headway. The average slowly-moving judgment of the Englishman tells him that this (in some cases eminently pleasing) method is *not* suited for the majority of his studies. The "time of exposure" question and equality of diffusion are serious objections in many cases.

There are signs of returning attention to bromide papers, both for direct and enlarged work. Roughness of paper and warmth of colour in this process are attracting attention. From seeing some specimens of work of the above character this year shown, we may reasonably expect further and still better results to follow presently.

Tending towards the scientific side, further and valuable advance has been made in the application of photography to detection of forgery.

Some interesting experiments have been made with, and results shown from, the use of the ordinary spectacle lenses in place of the more costly tools. This avenue of experiment also promises reward to those who have taste and time to follow it up with patience and discretion.

As regards subject and treatment, no great or marked advance is recorded.

Artificial light has been used in the treatment of single figures—with some measure of success. General opinion, however, regards the results as more of a curious and sensational, rather than of a restful or beautiful, nature.

The use of artificial light as an aid to unsatisfactory daylight has not yet received the attention it deserves.

Among professional workers there is a most welcome, if only slight, advance towards simplicity of treatment.

The accessory, hitherto apparently inevitable, shows slight symptoms of retiring to its proper place, viz., the background.

As soon as the professional worker can prevail upon his sitter to assume a simpler, quieter style of dress, he (the operator) will have a much better chance of making his work a portrait of the sitter rather than of the sitter's garments. Regarding the figure as part of a composition, there is observable a general "levelling up" in the matter of naturalness of pose, appropriateness of dress, occupation, &c.

Landscape, pure and simple, does not attract many workers; but among the few who follow this branch of art there are welcome signs of the poetic feeling making its way into their work presently; but, as yet, the "grain" of the paper is too largely their anchor of salvation, and is held to with the hope that it may cover a multitude of sins.

There seems a growing tendency among a certain number of photographers to try and make their photographs resemble as much as possible the paintings of Gainsborough, Constable, or some other brush worker. Whether this effort on the part of photographers to produce painter-like work is an effort destined to place photography among the fine arts must be left for time to decide. Much can be said on both side. Our immediate concern in the matter is to record the effort and its tendency.

Architecture, a branch of work in many ways pre-eminently adapted for photographic representation, seems each (recent) year to be dropping more and more into the neglected area.

Lantern slides of artistic subjects retain their last recorded position.

On the whole it may be granted that there is no marked symptoms of any great artistic advance. At the same time, perhaps, it may be said with equal truth, that one does not see quite so many offensive productions as in former time—offensive, *i.e.*, in the sense of displaying a *conspicuous absence* of the most elementary and self-evident rules of pictorial composition.

There is a decided, if slight, general advance towards simplicity of selection and treatment. And it may further be said that there are hopeful signs that the camera man is being slowly drawn out of the beaten track (Conway Castle has had a "good time" in the past).

It may be taken as an axiom that the best average work is done by those men who select for themselves some branch or group of allied subjects, and make them an object of their special care. By this method a more intimate knowledge of the conditions favourable to success arise because there is a healthy restraint imposed upon the very common tendency to "go in" for

everything. On the one hand we have the danger of becoming a "Jack-of-all-trades"; on the other, that of becoming so cramped and confined by a too vigorous adherence to a narrow and isolated branch. The old saw of "knowing something of everything and everything of something" may very well be applied as general advice to the photographer of the future, viz., that if he desires to be a man of mark in any branch he must give his chief attention to that one branch, always remembering that all other kindred subjects are capable of throwing light upon his own special department, and, therefore, he must endeavour to keep abreast with the best authorities in their several departments.

In all branches of art and science there is a marked tendency to become the devotee of some one idea to the exclusion of all else. This is a growing feature of the times in contemporary photographic art.

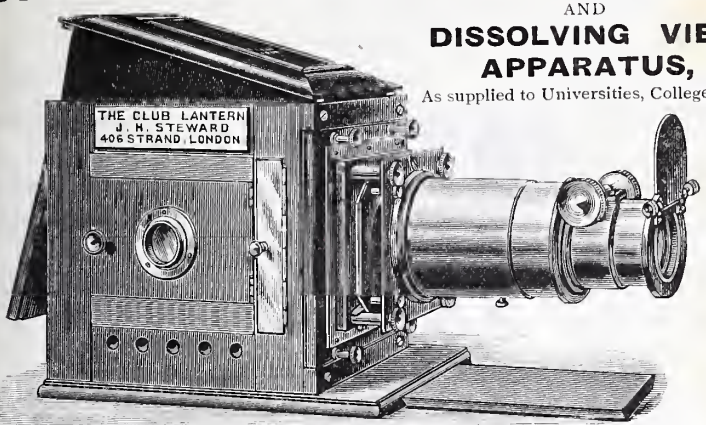
READ
"PHOTOGRAPHY,"
THURSDAYS,
1d.

J. H. STEWARD'S OPTICAL LANTERNS

AND

DISSOLVING VIEW APPARATUS,

As supplied to Universities, Colleges, &c.



THE "CLUB" LANTERN,
For Limelight or Oil.

THE "CLUB" LANTERN.—A best quality Single Lantern, with superior 4¼in. Condensers and extra large front Lenses, 2⅝ inches diameter, giving fine definition and great illumination. Price, complete with jet in case ... ... **£15 15s.**
The entire front reverses for portability.

ORDINARY LANTERNS (Oil Lamps) from **£2 2s.**

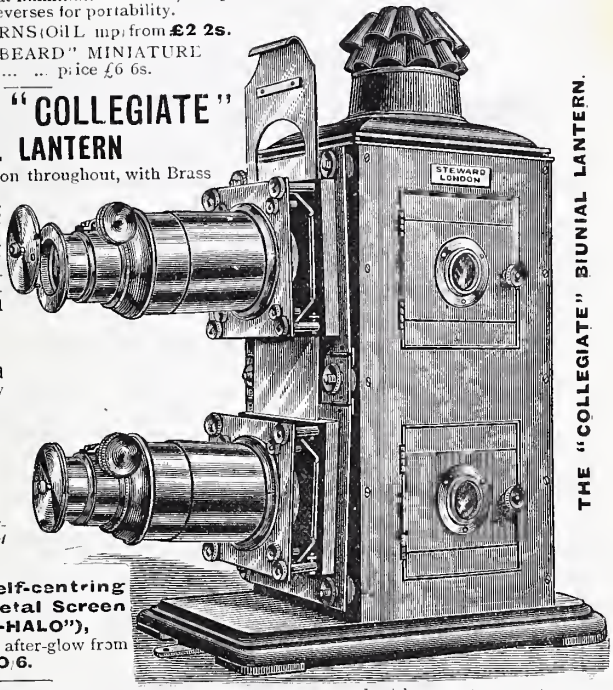
The "PRINGLE-BEARD" MINIATURE LANTERN ... ... price £6 6s.

STEWARD'S "COLLEGIATE" BIUNIAL LANTERN

Of superior construction throughout, with Brass Fronts and thoroughly good Lenses for long and short focus, pair of Blow-through Jets, with best Lime Turners, Gas Dissolver, Rolling Curtain Shutter, and Strong Case.

£20 complete.

This will be found to be a thoroughly practical apparatus.



THE "COLLEGIATE" BIUNIAL LANTERN.

PROJECTION MICROSCOPES
AND
POLARISCOPES.

All apparatus personally tested and guaranteed

Beard's New Self-centring Carrier with Metal Screen (THE "ANTI-HALO"),
For shutting out the after-glow from Lime, **10/6.**

COMPRESSED GAS supplied at the **cheapest rates** and with utmost promptness.
REGULATORS AND GAUGES, improved patterns. **OPERA GLASSES** for focussing, from **10/6.**
ILLUSTRATED CATALOGUES (gratis) post free to all parts of the world.

OPTICIAN TO THE BRITISH AND FOREIGN GOVERNMENTS, &C.

406, 457, STRAND; 54, CORNHILL, LONDON.

TELEGRAPHIC ADDRESS:

"EOTHE" LONDO

THE

IMPERIAL PLATES

Possess the following advantages:

GREATER SENSITIVENESS,
CRISPNESS OF IMAGE, DELICACY OF DETAIL,
RAPIDITY OF DEVELOPMENT,
AND
RAPIDITY OF FIXING

Will save half the time in the dark room.

THEY ARE MADE IN THREE RAPIDITIES:

	¼	½	1/1	
Ordinary ..	1/- ..	2/3 ..	4/3	per doz.
Extra Rapid .	1/3 ..	3/- ..	5/6	,,
Extreme Rapidity	1/6 ..	3/8 ..	6/6	

And other sizes at same popular prices.

The Imperial Dry Plate Company,
LIMITED,
CRICKLEWOOD, LONDON, N.W.

SECTION IV.

SELECTED ARTICLES

ON

PRACTICAL SUBJECTS

BY

PRACTICAL MEN.

TRADE **XL** MARK.

B. J. Edwards & Co.,

THE GROVE, HACKNEY, LONDON.

PLATES, FILMS, PAPER, DEVELOPERS, REDUCED IN PRICE.

Edwards's Special Rapid Plates & Films.

(RED LABEL.) Sensitometer No. 24.

For Quick Work in the Studio and INSTANTANEOUS PHOTOGRAPHY.

May be used instead of "Instantaneous" Isochromatic when it is preferred to develop by the ordinary dark-room light. .

These Plates and Films will be found invaluable for quick work. They combine with extreme sensitiveness all those good qualities for which our ordinary plates have for so long been justly celebrated.

EDWARDS'S SPECIAL LANDSCAPE PLATES & FILMS.

(GREEN LABEL.) Sensitometer No. 12.

For Views, Architecture, and all work requiring GREAT LATITUDE IN EXPOSURE, together with PERFECT FREEDOM FROM HALATION.

These are made of uniform medium rapidity, and although quick enough for Drop Shutter work in a bright light, will yield bright and sparkling negatives even with four or five times the correct exposure. They are the easiest of all plates to work.

Edwards's

ISOCHROMATIC PLATES & FILMS.

(BY ROYAL LETTERS PATENT.)

YELLOW LABEL.

"MEDIUM" (Sensitometer about No. 20), for Landscapes and Copying.

"INSTANTANEOUS" (Sensitometer about No. 25), for Studio and Drop-shutter work.

REDUCED IN PRICE.

NEW PRICE LIST OF

EDWARDS'S PLATES & FILMS.

Size.	Doz.	Size.	Doz.	Size.	Doz.	Size.	Doz.
3¼×3¼ inches	1/3	6½×4¾ inches	3/8	8½×6½ inches	6/6	13×8 inches	14/-
4¼×3¼ ,,	1/6	7½×4½ ,,	4/6	9 ×7 ,,	8/-	12×10 ,,	16/-
5 ×4 ,,	2/6	7½×5 ,,	5/3	10×8 ,,	10/-	15×12 ,,	24/-
6½×4½ ,,	3/3	8 ×5 ,,	5/6	12×8 ,,	13/-	Larger sizes to order	

		½-plate.	5×4	½-plate.	7½×5	¾-plate.	10×8
Cost of Postage on Plates.	1 doz.	4½d.	4½d.	6d.	7½d.	10½d.	1s. 1½d.
	2 ,,	6d.	7½d.	10½d.	1s. 1½d.	1s. 6d	

Orders value £2 nett delivered free in London.

Orders value £10 nett delivered free in the United Kingdom.

B. J. EDWARDS & CO., The Grove, Hackney, LONDON.

EDWARDS'S

TRADE **XL** MARK.

SENSITISED PAPER.

"The Perfection of Silver Printing."

WILL NOT BLISTER.

Sample Sheets, whole, or in packets cut to any standard size, post free in the United Kingdom,

9d.

SPECIAL TERMS TO USERS OF LARGE QUANTITIES.

Edwards's XL Gold Toning Bath.

This Toning Bath is prepared by a new Formula, which gives rich purple tones. It will be found convenient and economical in use, and can be used successfully for Opals and Transparencies, as well as for prints on albumenised paper.

Two Solutions (Concentrated). Price—Two 4-oz. Bottles in case, with instructions for use, 3/2; by Parcels Post, 3/6.

—*—

B. J. EDWARDS & CO.,

The Grove, Hackney, London.

Telegraphic Address: "EXCEL, LONDON."

EDWARDS'S

SPECIAL TRANSPARENCY PLATES

FOR LANTERN SLIDES.

WORK equally well with **Pyro** or **Hydrokinone,** and give **rich warm tones,** or engraving black at will, with **absolutely clear glass** in the high lights. They are sufficiently rapid to use in the camera when reducing from larger negatives, while for contact printing **a few seconds to gas light** s all that is required.

PRICES—3¼ × 3¼ inches (Lantern size) 1/- per doz.
6¾ × 3¼ ,, (Stereo size) 2/9 ,,
Other Sizes same price as Isochromatic Plates.

NOTICE.

Each dozen of these Plates is packed in a special **grooved box,** which can be afterwards used for storing the finished Slides.

B. J. EDWARDS & CO.,
The Grove, Hackney, London.
Telegraphic Address: "EXCEL, LONDON."

SECTION IV.

SELECTED ARTICLES ON PRACTICAL SUBJECTS BY PRACTICAL MEN.

SOME NOTES ON OUTDOOR WORK.

BY BERNARD ALFIERI.

IS there anything to he said on matters photographic that has not been fully dealt with, either in the columns of the photographic journals or by word of mouth at the various clubs in the form of lectures and discussions? I trow not; hut in response to the Editor's request for a contribution I have tried to embody in the present paper some suggestions in pursuit of picture making out of doors that may prove useful to heginners. Alas! that they are not new.

Taking, first of all, the matter of locality, I have no hesitation in saying that any district in any part of England, covering an area of a few square miles, will furnish the photographer with material for a life-time if he can be induced to stick to it. The man who rushes about from one place to another in search of the heautiful, from the Lakes to the Land's End, may he trusted to turn out nothing likely to further the art he practises. It is far more profitable to fix on one or two localities adapted for different classes of work and study them thoroughly—I had almost said indefinitely, for there is no end to the varying moods of nature. See what Constable did for the Valley of the Stour, his native place, and Gainsborough for the Orwell. The former, if we except a short time passed at Salisbury and at Hampstead, made the delineation of ten miles of river scenery and the undulating valleys of Suffolk his life's work.

There need be no "specialising" with it as far as I can see. If a man devotes himself to one particular line, whether the portraying of animal life, architecture, genre, or figure subjects alone, it is apt to he monotonous to his friends and admirers and demoralising to himself, for it gives the unthinking reviewer a cheap criticism ready to hand, of which he is not usually slow to take advantage. We are told that it is an age of specialists, but I am no advocate for specialising with regard to photography, and hold that if a man can do good work in any one branch of the art he may he safely relied on to show artistic capahilities in another. It may seem a hold statement on the face of it, but a study of any of the leading workers—with very rare exceptions—will show what versatility they exhibit, and the success that attends their many-sided abilities.

Size of camera has, perhaps, something to do in limiting the selection of subject; in fact, one would hardly care to make a study of animal photography with a larger-sized apparatus than ¼-plate. To stalk a flock of sheep with a 15×12, or to bring a 20×16 to bear on a herd of Scotch bullocks would carry consternation into the camp, and be worse than futile. A whole-plate is bad enough, and I have followed sheep, during the lambing season, for a day over a forty-acre marsh field, without getting satisfactory grouping enough to warrant the exposure of a plate, as well as having had to beat a rapid retreat with my impedimenta before a hasty bullock, tormented with flies, on a narrow causeway that lay between dykes, with scarcely room for both of us under ordinary circumstances. It does sometimes happen like this in animal photography, but many difficulties may be surmounted by knowing the locality thoroughly; this knowledge is only attained by constantly visiting one place you have found suitable for work, studying the manners of men and sheep, and making a friend of the farmer and his shepherds upon whose land you wish to trespass. By this means you get to know their habits as the perfection of regularity; where their flocks will be at certain hours of the day in certain seasons, and, what is far more valuable, you may obtain their assistance, for in the hands of those who have charge of them animals become as plastic as the modeller's clay.

Snap-shots are successful at times, by lucky combination of circumstances over which the photographer has no control, but really good work, reliable and certain, is just as much the outcome of forethought and careful planning as it is in genre subjects or portraiture in a well-appointed studio.

How often you see groups of animals photographed, simply because they *are* animals. Without incident of some kind, some suggestion of a story left to the imagination, such pictures are valueless for art purposes, and may very well be left undone. Of course, if the photograph be taken to show the cows appertaining to some enterprising company's dairy farm, or for purposes of advertisement, it matters little about incident so long as the shutter has been made to work satisfactorily, and the focussing is correct. A great deal depends upon what the photograph is wanted for; you might desire to exhibit it.

To turn to landscape for a moment, a very useful thing to carry in the waistcoat pocket is a view-finder, whenever one is prospecting in new country. Even in the dead season, when there is a temporary cessation of photographic work, one can form a good idea of the aspect a given view will assume under different conditions, and make notes accordingly. Yet, *per contra*, it is curious that one may know a certain turn of the road, a bit of common land bounded at the further end by a five-barred gate, and a haystack, as one thinks perfectly well; then there comes a startling effect of light and shade across it, or the lines are broken up by a carrier's cart or a gipsy encampment, giving it an entirely different appearance, and bringing with it a revelation of possibilities hitherto undreamt of. This does not only happen once in a lifetime, it is perpetually springing in upon you from the beginning of a season until its close, but chiefly are these effects visible when viewed *against the light* instead of with it. Very beautiful they are, too, but, beset with technical difficulties it is worth the expense of some time and trouble to overcome. Have you seen water in motion when sunlight is playing upon it, the eyes towards the source of light, of course—how it glistens as the forked lines run across the sun's pathway; a frozen river, when the thaw comes, and the ice is broken into a

myriad crystals, shining like burnisbed gold in the red rays of a winter's sun; a canal on a grey December day, the sun struggling through in fitful breaks to light the trackway of the coming barge shimmering like precious stones? All these are against the light effects, and in winter, when the sun is very low down in the heavens, are sufficiently difficult to secure. Shade your lens how you may, the sun generally manages to outline the diapbragm circle upon the ground-glass; shift your position to avoid it, and the effect is gone See again a flock of sheep with the light and against it—how, in the latter case, their bodies assume a dull grey hue, but an outline of vivid light runs round them as of fire.

Truly there is a great deal to be said for photography against the light, and it is being recognised by good workers; until lately it has been the custom to work with it and only that way.

To sum up, there is no pleasure in photography equal to that experienced in having secured, as one thinks, a satisfactory exposure; undeveloped, there is just that dash of uncertainty about it that affords fruitful speculation for the rest of the day, but the nearest approach to it that I know of is "loafing." By loafing I don't exactly mean a want of employment for heavy hanging time, but rather that outward expression of a philosophical temperament that knows how to wait and take things easily. The proverb says everything comes to him who waits. Impetuosity is a failing common to most ardent photographers, and results, not infrequently, in a dozen exposures that never overstep the bounds of mediocrity. The philosopher waits for certain eventualities that are bound to be, and goes home smiling at having secured one exhibition picture and saved eleven plates.

A Portable Photographic Studio, and How to Build It.

By "Amateur."

SINCE writing the article on "Building a Studio," which appeared in last year's Annual, it has crossed my mind that perhaps it would be quite as useful, if not more so, to describe the building of a *portable* studio, and I determined to write a paper on the subject for the Annual this year, and after much thinking and contriving so as to make it answer the purpose without having to dip into one's pocket too deeply, the present paper is the result. I think, and I hope to make my readers think, tbat I have attained my object, as the building about to be described can be taken up and down in about two hours, and, being made of very light material, it can be easily carried from place to place; can be made by the veriest amateur in carpentry and joinery, and will cost a very nominal sum when finished. What more can be wanted to suit either rich or poor, young or old, male or female? Nothing, surely. It can be erected at garden parties or at places of amusement, and could be made an easy means of raising the wind at bazaars and

fancy fairs, while to the strolling photographer it would be a perfect godsend, costing much less than the heavy, clumsy van, requiring less labour for removal, and answering the purpose far better in the end. Now, having said so much by way of prelude (I hope no one will say "blowing my own trumpet"), I will proceed to business. First, as to the materials required, these are as follows, viz.:—

	£	s.	d.
4 pieces 7ft. long 2½in. × 2½in. for corner posts = 28ft. at 1d.	0	2	4
2 ,, 16ft. ,, 2½in. × 1½in. for bottom sills } = 48ft. at ½d.	0	2	0
2 ,, 8ft. ,, 2½in. × 1½in. for end sills .. }			
750ft. 1½in. × 1in. for frames, &c., at ¼d. per foot	0	15	7½
80ft. 4½in. × ¾in., for ridge boards at 1d.	0	6	8
600ft. 1½in. × ½in. for rabets to frames at ⅙d.	0	8	4
16 screw bolts, as fig. 9, at 2d.	0	2	8
16 dowels, as fig. 10, at 2d.	0	2	8
100 yards Willesden paper, 4-ply, at 1s. 2d. per yard	5	16	8
Nails, screws, and hinges, say	0	3	8
75ft. glass at 1½d.	0	9	4½
Total	8	10	0

I have given the prices as well, so as to give some idea of the cost. As will be seen by far the principal item is the Willesden paper, and if this amount is too much, it can be considerably reduced by using 2-ply instead of 4-ply, this can be obtained at one shilling per yard, double width, so that instead of coming to the amount shown above (£5 16s. 8d.) it will only come to £2 10s., but while the 4-ply, which I recommend to be used, will stand a good deal of rough usage, the 2-ply must be used with more care, but as the manner of using is identical in both thicknesses, I must leave it to the user to have that which suits him or his pocket best.

Now, having obtained the materials, we will proceed to build the studio, or rather to make the necessary parts required to build it.

First take the four corner posts and plane them up square, and run an inch groove down the centre of two sides, and chamfer off the edges, so that they show the same end section as fig. 4, then take the side and end sills, and make them to the shape shown in fig. 3, then make out of some of the 1½in. × 1in. two pieces 16ft. long of the section shown in fig. 7; the dotted line A shows how to nail the two pieces together to form it, and the piece B is hinged as shown, the reason for this will be seen further on; now on all the sills and also on the top rails (fig. 7) at each end of every piece cut a short tenon to fit the groove in the corner posts; now take the screw bolts, fig. 9, and screw one in each end of the *side* sills, and also in the top rails *in the grooves*, letting them in flush with the bottom of groove (as shown at C, figs. 3 and 7) and leaving 2½in. projecting beyond the short tenon above mentioned; now take the *end* sills and cut on each end a tenon, as on the side sill, and then screw on one of the screw bolts in the same way, but on the bottom, that is the plain side. Now take the corner posts again and in the centre of one groove of each, bore a ⅜in. hole 2 inches from the end, and also one hole four inches from the other end, then in the centre of the other groove in each post bore a hole 2 inches from the end at which you left 4 inches before; this

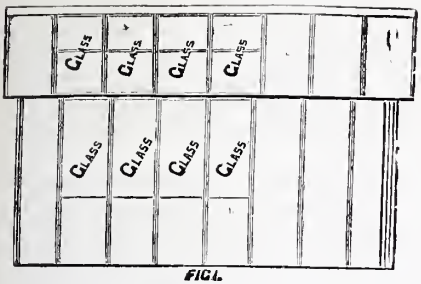


FIG 1.

Side elevation of studio.



FIG 2

End elevation of studio.

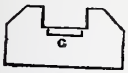


FIG 3.

Section of sills. (C, bolt for fixing to corner posts.)

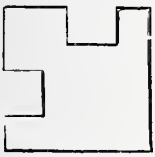


FIG 4.

Section of corner posts.



FIG 5.

Section of side and end frames, showing slips A.



FIG 6.

Elevation of side frame.

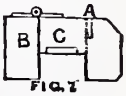


FIG 7

Section of top rail (A, method of making; B, inside piece hinged to top; C, screw bolt as in sill).

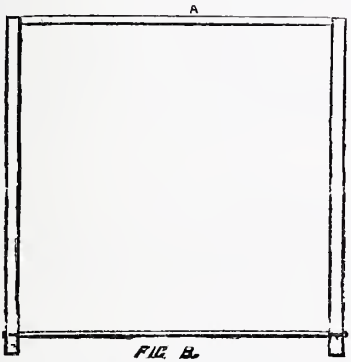


FIG 8.

Elevation of end framing, showing end top rail, A.



FIG 9.

Screw bolt as at C, figures and 7.

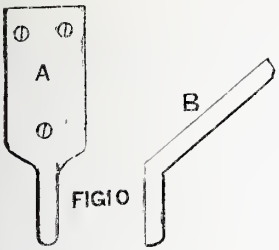
is rather complicated, but it will be clear when I explain what the holes are for. Now in the end of the posts, at the side where there is only one hole, bnt at the opposite end, cut a dovetail, as shown in fig. 13. The best way to do this is to make a template of thin wood and mark them all by it, and then the piece which fits into it can be marked in the same way, thns ensnring a good fit. Care must be taken to make the above parts in pairs as shown clearly in fig. 13.

Having got so far, we will proceed to erect the skeleton of the studio. To do this, lay on the ground two of the corner posts 16 feet apart, with the grooves with the two holes in facing one another, and the other grooves npper-most. Then take one of the side sills and pass the bolts through the holes in posts at the bottom end; that is, where there are holes in both grooves (if this has been done right, the bolts of the side sills will pass through the holes, which are four inches from the end of posts). Then taking one of the top rails, put it in the same way through the holes at the other or top end of posts. The bolts can now be screwed np, and the skeleton of one side is done. Now put the other together in the same way, taking care that it lays just the opposite way up, so as to form a pair. The two sides can now be raised up, and the end sills inserted in the same way. It will now be seen why the bolts of the side and end sills are pnt on the top and bottom sides respectively. The end sills being screwed up tightly, nail a piece of wood temporarily across each end near the top to hold it the proper width while you cut the piece to fit in the dove tails at the extreme top of the posts. These two pieces can be made of the 1½in. × 1in., and must be put in flat way, so that the inside edge is level with the inside of corner posts.

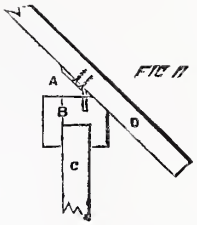
Now dove-tail two pieces across the two top rails at eqnal distances, so as to form three divisions of 5ft. 4in. each, (these are to act simply as ties to prevent the roof from spreading the bnilding out and collapsing altogether), they must be dove-tailed in half-an-inch only, or they will weaken the top rail too much.

The skeleton is now finished, and the worst part done. Now comes the making of the frames to fill in the sides and the roof. These will be made from the 1½in. × 1in. deal, which must be cnt off to lengths of the distance between the grooves of top rail and sills, and two feet lengths for the cross pieces, as we shall want sixteen frames for the sides. It requires 32 pieces of the former length, and 48 of the latter; they have simply to be planed np and halved together. Fig. 6 shows elevation of one frame, and fig. 14 shows detail of halving. I only recommend the frames to be halved together, as that is the easiest way, but if the maker is able to do it the better way wonld be the mortice and tenon, but this I must leave to the skill of the reader, as one way is nearly as good as the other; at any rate, for the purpose now under consideration.

I will now suppose that the frames are all finished, and they can now be covered with the Willesden paper. To do this, cut off twelve pieces the same length as the frames, and also cut off 32 pieces of the 1½in. × ½in. the same length, or, rather, an inch shorter to be quite exact. Plane these up, and chamfer the edges as shown in fig 5, where these pieces are shown at A A. Now take one of the frames and lay flat on the bench, then lay a piece of the paper on it, keeping the edge of the paper level with the edge of frame, then take one of the 1½in. × ½in. slips and nail on the frame so as to overhang



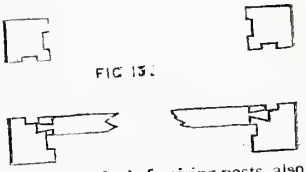
Dowel, to hold roof in place (A, Fig. 11). A, front view. B, side view.



Detail showing how roof frames fit on sides. B top rail. C, side frame. D, roof frame.

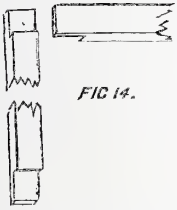


Detail showing side sill and top rail bolted to corner post.

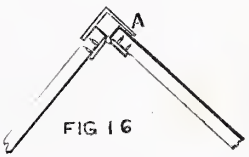


Showing method of pairing posts, also insertion of end top rails.





Detail of halving frames together



Detail of roof frames (showing hinges) and ridge board.

Side section, showing corner posts, frames, slips and paper (much exaggerated).

about half an inch. It must be nailed pretty firmly, so as to hold the paper tight. Now turn the frame over, and fold the paper over the edge of frame and double down the surplus on the side, and fix it there with another slip put on in the same way as the first one. The slips must both be put on at equal distances (half an inch) from end of frame. The whole arrangement is shown in fig. 5, the thick line showing the paper. Eight of the frames must be made like this, four more must be made the same, only instead of the outside slips overhanging in two of them, and the inside slips in the other two, they must be kept back from the edge half an inch to allow the frames to enter the grooves in corner posts. Fig. 15 is a section of one side showing the corner posts, slips and paper complete. There are yet four of the frames uncovered. These must be done the same as the first eight, as far as the slips are concerned, but the paper must only reach up to the middle rail, the top part having to be filled in with glass, which had better be the last job. The side frames can now be put in their place, which can be done by lifting the inside hinged piece of the top rail (B, fig. 7) and standing the bottom of frame in its groove, when the top will push into its place—but to get the last one in, it will be necessary to slacken the bolts, and knock off the post about half-an-inch, and when the post is screwed up again, and the hinged piece turned down, all will be firm and strong. The roof is the next to be done, this will be made in the same way as the sides, only each frame must be a quarter of an inch wider, and the length will be six feet, the inside slips must also be dispensed with, the paper at one edge being tacked to the edge of frame, and the slip will overhang at the other edge three quarters of an inch. Sixteen frames only will be required, twelve of them covered with paper and four filled in with glass. These frames will be hinged together at the top ends, as shown in fig. 16, and to put them in place they are simply opened out over the top and the dowels (fig. 10), one of which is screwed on one side piece of each frame, about six inches from bottom, fit in holes made for them in top rail, when their own weight will keep them in position—care must be taken that the holes are made so as to show an equal margin overhanging at each end of the studio, this can easily be found out by measurement. We have now only to fill in the ends and it is done, these will be made up of four frames, made to fit the slope of roof, and made in the same way as the side frames, but at one end one of them must be made in two pieces, the bottom piece being about six feet long, to form a door; the piece over the door can be fixed in its place with a couple of screws into the top cross piece. The door will be made as the other frames, but the paper must be folded over both edges, and a slip put on each edge inside, also one at the top, these will form rabets and stop out the wind and weather. The hanging of the door and fastenings for it, I will say nothing about, as that will be a matter understood by anyone.

Now cut off two pieces of the $4\frac{1}{2}$in. $\times$ $\frac{3}{4}$in., and nail them together so as to form a ridge board (A, fig. 16); also screw pieces of the same stuff up close under the roof at each end to hold the end frames together, and our studio is finished. But I am getting too fast, the glass is not in yet. Tack some half-inch slips round the frames where it is to go to form a rabet, and rub a little paint round to make the putty stick, and then put in the glass, which is such an easy matter that it will need no instructions from me.

A coat of paint on all exposed woodwork would be an improvement, both as regards look and lasting qualities, but that must be left to each individual studio builder, as it concerns him more than it does me.

The studio is now up, and after the first time of erecting it will be found that it can be taken up and down in far less time than it has taken me to write this, and the only fragile part about it is the glass, and I am making enquiries as to another transparent material which can be used as a substitute, but they have not yet been successful. If they are before this is published I will add a description of the material, with particulars as to price, &c., to this article.

I have not included a dark room in this paper, but I have in preparation a paper on a collapsible one, which would be suitable to go with it, and if the Editor permits it shall appear in the ANNUAL with this paper. I have now nothing further to add except to wish every amateur studio builder (and, of course, professionals as well) success, and if there is any point which appears doubtful, a line through our friend the Editor will always command my instant attention, as I shall always endeavour to do my best to assist, as well as I can, any of my brother amateurs, especially if by so doing I can add to the popularity of our paper, *Photography* and the ANNUAL.

THE OPTICAL LANTERN AND ITS MODERN INVENTIONS.

C. D. BISHOP.

THE past year has not been very eventful in the production of any rapid advantages in the optical world. The use of compressed gases in cylinders has become more general, but it is to be regretted that better facilities are not offered by the various companies (who supply the oxygen under Brin's patent) for filling each other's cylinders. It might be as well to advise intending investors in cylinders to always send their cylinder to one company, as each company appear to have a different valve and thread, and some go so far as to refuse to fill a cylinder unless fitted with their own pet valve. Now, to say the least, this is very provoking, saying nothing of the anxiety it will cause at the last moment when the gas is wanted. Why all these branches or companies cannot adopt one and the same valve and fitting I am at a loss to conceive.

A word about regulators. Now a regulator to reduce the gas from 120 atmospheres to a uniform pressure of a few pounds needs be a very delicate and extremely well-made piece of mechanism, seeing that the the brass generally used for castings is too porous, and gas will pass through under this pressure, although in a very small degree. To expect a single regulator to adjust itself the same as bags is practically an impossibility. If a regulator is tested on a column of water you will find it will never shut off twice at the same pressure. Perfect regulation can only be obtained with a secondary regulator acting on the first.

The new incandescent light is certainly a novelty, but in its present state cannot be adopted with any practical success, as the force to supply the illuminant is either a foot bellows, which must be kept working, or a small hand bellows; stop working the bellows, and your illuminant goes out; the smell, too, is very noticeable. It has a wide field in front of it for its development.

The ether saturator, when worked with proper jets (I mean chamber jets that are properly packed, and with a suitable chamber) is very satisfactory, and may be used in a double lantern without any fear of pops, if dissolved gently, providing the dissolving tap is perfect. Now, in this age of cheapness, technical finish and detail are overlooked, and unfortunately a secondary consideration with dealers, who simply sell what is brought to them. I have come across dissolving taps of lamentably careless construction. Now that cylinders are generally used with their extra pressure, the danger of a badly-made tap is so much more lamentable, and I must say dangerous, unless the plug is properly ground, and the oxygen and hydrogen made to come up in their respective order. In dissolving, the jets pop, blowing off the tubing. Some that I have tested have been so badly fitted that the oxygen comes out of the hydrogen side, and *vice versâ*. Now this would be a great source of danger if bags were used, as it would certainly mix the gases if the bags were left for two or three hours, but not unless. In the usual course it would blow off the tubes; the experienced operator would know there was something wrong, and, if he is wise, would discontinue until he found the fault out.

To test a dissolving tap, connect the main supply pipe to hydrogen cylinder, closing up the outlet with your finger, or, better still, fit a small cork, and apply a light to the tubes that should be off, and if there is a leakage it will make itself known by the presence of a small flame. If this is so, have nothing to do with the dissolver; if they are once wrong, they cannot easily be patched up, as some would have us believe. One of the secrets of successful lantern work is to have everything as perfect and as well made as possible.

FLOWER STUDIES.

By NORMAN BLAKE.

NOW that photography has become so popular, and it is difficult to find a subject, mortal or immortal, that has not been photographed from every conceivable point of view, the photographer, tired of studying such subjects as relations, friends, from all possible points of view, and every landscape within range, naturally tires for pastures new. The question arises, where is a fresh subject to be found? For a novelty, I beg to introduce a study within the reach of all, which for variety, beauty, and scope for artistic treatment, is second to none, viz., flower studies, a branch of photography which has received but scant attention. The apathy of the vast army of photographers to study these charming subjects is, I

venture to assert, mainly due to the following reasons: Firstly, the want of recognition they receive in the medal list of our exhibitions, for more often than not the class for "still life" receives no award, a fact that does not induce one to compete; secondly, the idea that the use of isochromatic plates is a necessity. This is not a fact, for, although they are indispensable for some subjects, most successful pictures can be obtained on ordinary plates. In photographing flowers, there is unlimited field for artistic lighting. It is a mistake to attempt to render flowers in all their softness and beauty of detail in the open air, therefore a studio must be improvised. With the aid of a few blinds and tissue paper screens (a conservatory or greenhouse answers the purpose admirably, but as these are not always attainable) an ordinary window (north preferable) will answer the purpose. The majority of subjects require a rather high side light, but under variable circumstances the lighting arrangements would be so altered that any attempt at detailed description would be useless. A good diffused light is the best, so, should it be too strong, cover the windows with white tissue paper, and a sheet or two of white cardboard will be found useful as reflectors. The actual arrangement, of course, depends on the taste and artistic ability of the photographer. I consider the method of fastening the flowers up to the board or background with pins is fatal to light and graceful effect. Another mode of arranging the flowers is to place them on a level surface, and suspend the camera above. All I can say is, do not try it, for it is neither dignified nor comfortable standing on a box with the neck at a painful angle in the vain endeavour to see what is on the focussing screen, and, as a rule, the higher the camera goes, the stronger the language becomes. When everything is just ready, and the cap falls off in the midst of the flowers it is best for the onlookers to retire. In massing the flowers the shortcomings of the plate must be remembered, and the colours arranged accordingly. The use of a piece of blue glass in viewing the landscape (the idea of Mr. Valentine Blanchard) is equally valuable for this particular branch of photography, as by this means the colours appear as in monochrome, giving a good idea of the finished result. It will be found a great help in setting up and lighting the subject if it is placed on a revolving board or table. There need be no lack of variety in the backgrounds, as many different ones are so easily improvised; an old oak panel answering splendidly for a basket of light-coloured blooms. Another very effective and inexpensive one, which photographs admirably, is made in the following manner. A large packing board is brushed all over with glue, and then covered all over with cork dust; when dry, stand on end and lightly brush. If it is found that sufficient cork does not adhere, sprinkle the surface with glue and repeat till the desired effect is obtained. For beauty and simplicity this background is *par excellence*. Tinted papers also answer the purpose well.

Having arranged the subject, the apparatus now claims attention. A rather long extension camera and lens of about 6in. focus answer the purpose best; a small table on castors takes the place of the tripod with advantage. Experience and a few trial plates will determine the correct exposure, but always *over* rather than under expose. Some makes of plates are much more suitable than others for this kind of work, a slow, thickly-coated plate giving the finest results. In cases where there is a mass of light bloom the plate should be backed; there are no negatives which require more careful

development. A formula should be selected which gives all the detail without too much vigour, for nothing is more fatal to beautiful results than a hard negative. I have found the following developer all that can be desired for giving negatives full of detail, and yet producing that softness which in the resulting print is so much admired :—

No. 1.

Hydroquinone	140 grs.
Sodium sulphite	2 ozs.
Citric acid	20 grs.
Bromide potassium	20 ,,
Water	20 ozs.

No. 2.

Sodium hydrate	140 grs.
Water	20 ozs.

Commence development with five parts of No. 1 and eight of No. 2. When the detail is well out add the other three parts of one in instalments till the required density is obtained, always bearing in mind not to carry development too far. The oxalate and iron also produce splendid negatives with some makers' plates. Having secured the negative, the question arises, What printing process will suit it the best? In my humble opinion there is nothing more beautiful than a richly-toned print on gelatino-chloride paper. Having gone roughly over the main of this study, I will leave to the consideration of the photographer an almost endless array of undoubtedly beautiful subjects, which possess the great advantage of having no vanity to be satisfied.

Magpie Negatives.

By George A. Carruthers.

"SOME new photographic humbug with an outrageous name, and probably first cousin to its rival in nomenclature, para-amido-phenol, or one of the other members of Dr. Andresen's numerous progeny," we expect will be the exclamation on reading the above title for the present article. But no, gentle reader, the subject under discussion has nothing to do with chemicals more than that we hope, having enlarged and developed it suitably, we may be able to fix it unfadingly in the minds of those who may deign it worth perusal, though, doubtless, when that desirable consummation has taken place, the exclamation will be "Oh, that's nothing new! I knew that years ago!" and probably end by a short prayer on behalf of the Editor for beguiling them with an attractive title into swallowing, like plums in suet dumplings, the heavier matter.

The magpie is a bird common enough in certain districts, whilst in others it is entirely unknown. In the North of Ireland, where superstition, folk-lore, and fairy tales abound among the "pisantry," it is looked upon as, if not the big D. himself, certainly as one of his family, and there is not an old lady trudging to market but would religiously bow or perhaps cross

herself as it flew across her path, and then wait until another had been seen, when she would go on her way rejoicing, the rhyme having it that "one is for sorrow, two for joy, three for a wedding, and four for a boy." We scarcely at first sight notice the affinity of the last two for each other, but their order of sequence should be duly noted, though, indeed, it will only make us wonder what happens when it turns out to be one of the other sex. Well, as we remarked before, the magpie is a bird, and as it has nothing more to do with the subject in hand, we may dismiss it by saying that it has only been introduced in apology for a home-coined word, and that its main characteristic in appearance is its being entirely alternate patches of black and white, like the negative, in fact, that we wish to treat about.

There are few of us, we think, who have not at some time turned out such productions. How nice our elaborately thought out picture, and carefully posed models, have looked through the camera, with the sun shining on them, making the *tout ensemble* so lovely that we felt inclined to call a cab and rush home at once to develop our plate. And what medals have we not in our mind's eye seen scooped in by it, possibly even a P.S.G.B. one, and our picture hung on that particular wall where our uncrowned kings delight to have their work displayed when they can get the chance. Yes, we rush home, tired, perchance, after our work, and our minds full of excitement, and scorning our better half's mild expostulation to have tea before we begin "making that mess," but no, we have a duty to perform, and we perform it, forgetting the chances are all about tentative development, keeping back density until detail is out, and the other *et ceteras* we usually pride ourselves on and are so knowing about at our club. Away we go to our solutions, thankful we have not mistaken the hypo for the alkali bottle, as we see the image appear and know that it is all right, and so far all is well. What a woful disappointment, though, when we take our negative to the light. The girls' sunbonnets, aprons, and white dresses are as dense and black as our best Sunday hat. There is some half-tone, but oh! so thin, and that lovely bank of green, which looked so brilliant in the sunshine, is now represented by a patch of almost clear glass, and we feel that the world is all sawdust and photography a snare, and we have a violent pain in our temper.

Of conrse, if we attempt to print from such a negative as above, the result is an exact fac-simile of the bird we have been describing—mere patches of black and white, or soot and whitewash.

Having some negatives of this description, enquiries as to the best way of printing from them were duly made through the press, and resulted in many suggestions being kindly offered, but all erring in the same way, viz., treating the *back* of the negative with various compounds, matt and coloured varnishes, which were to be scraped away opposite the dense portions, tissue paper treated with blacklead and stump, and even cut-ont masks made from an untoned print and allowed to blacken—many, indeed all, of these were tried, bnt with the same result, a perceptible line of either white or dark colour, the diameter of the thickness of the plate, just as the mask shut ont or let through light on places it should not. The difficulty, too, of exactly superimposing the masks is an insuperable one.

Accident, however, suggested a plan which was tried with the happiest resnlts, and prints made where the half-tone was preserved, and detail secnred from even the densest portions.

Assuming that the negative is one that has been passed through a clearing solution, and is therefore devoid of all yellow stain, our first procedure is to colour it the deepest possible yellow, and to do so we can have no better medium than a solution of washing soda (not too strong, or it may cause frilling), to which some pyro has been added. This quickly oxidises and becomes muddy. See that the negative is free from greasy finger-marks, which would cause unequal staining, and place in solution, where it may remain for, say, half an-hour. It may then be rinsed, and when dry should be laid as flat as possible on an improvised retouching desk. All we now require is a strong solution of citric, or even tartaric, acid, a fine red sable brush, and piece of blotting-paper. Use the brush not too freely charged with acid, and carefully paint over the densest parts until, on looking through the negative, they are found free from all stain, the blotting-paper, of course, being ready at hand to immediately remove any acid that might accidentally get where it should not; then wash well and allow to dry. It goes without saying that a steady hand is required for small work; total abstinence is not, however, absolutely necessary.

There is another method differing from the above, though it is not to be recommended to the tyro, inasmuch as once a mistake is made there is not much latitude allowable for remedying it, whereas in the above method it is quite feasible to remove the entire stain and begin again *de novo*, without injury to the film. It consists of painting carefully over all the parts not to be touched with indiarubber solution, and submitting the remainder to the well-known ferrid-cyanide and hyposulphite reducer; the attendant risks, however, of such a process will be so patent to everyone as not to require enumerating here.

Prevention is, of course, the main thing to be aimed at in our development, and it will be found better to take half-an-hour over a valuable plate rather than try any doctoring afterwards, which at best is only a makeshift. A few experiments with various solutions will not be wasted time, though in our own hands we have found eikonogen most suited for this class of subject, giving, as it does, a flat image, and more or less free from violent contrasts.

TRUE RETOUCHING.

By H. Colebrook.

RETOUCHING seems to be a branch of photography in which the average amateur rarely attempts to practise. This may be caused either by a too great appreciation of the attendant difficulties, or by the need of a clear and precise direction of where and how to begin, but is more often still the result of want of time. Daylight is precious to the amateur of limited time, and he therefore devotes it to the production of photographs pure and simple—the more necessary, though not more interesting, portion of photography. On the other hand, there are many who would gladly try their hands upon so interesting a pursuit if they were only provided with a clear starting-point, and for these the following remarks are written.



Waterlow & Sons Limited, London

Collotype.

MEDMENHAM ABBEY.

It is a rather popular, though certainly fallacious, notion that retouching is to be learnt by a course of lessons under a competent teacher. Retouching, like developing, cannot be taught in a true sense, but must come by experience and careful practice, and this will be the more apparent when it is understood that the perfection (?) reached by the professional retoucher is the result of many years of close and constant work. It is to be hoped that the amateur will not attempt to rival the professional in this perfection, but rather look upon it as something to avoid, as no artist will allow that the retouching, growing more decided year after year, is reconcilable with true art. Retouching may comfortably be divided into two arts, viz., the art of improving upon the defects of a negative, and the art of improving upon the defects of nature. The absurdity of the latter will be acknowledged when it is remembered that the legitimate aim of portrait photography is the reproduction of a face, and not the creation of one—the production of a likeness, and not that which has no actual existence. Ruskin speaks of the "beauty of ugliness" in the universal fitness of things, and it will surely be understood that the removal of ugliness from a face does not enhance its beauties, but rather tends to lessen them by the lack of contrast. Far more art is shown, therefore, in the removal of mere mechanical defects and the exaggerations due to light and colour than the removal of that which ought to be seen, or the addition of that which has no real existence.

The would-be retoucher will, of course, start with a more or less limited knowledge of what constitutes a good negative, and it is needless to say that the *less* limited the knowledge is on this point the greater probability there will be of his first attempts being in a measure successful. That is to say, he must have learnt what really constitutes a good point or a defect in a negative, and must be able to see more or less clearly the positive of the negative upon which he is working. With this knowledge, then, he has first to learn how to work, and then where to work.

Some prefer the reversal of this order, but it will generally be found less simple to the amateur who is not thinking of bread winning. First, then, how to work. The materials necessary are few, cheap, and easily obtained. A retouching desk is, of course, preferable, but not absolutely necessary. A piece of brown paper with a small hole in the centre, held against a window commanding a space of clear sky, would really be sufficient, but the position would be found to be irksome and tiring if any length of time were occupied in the work. Failing a clear space of sky, a piece of opal plate would prevent any objects being visible through the negative. The pencil used most generally is a 3H, but HB will do, as the choice of pencil largely depends upon whether the touch be light or heavy, and this can be ascertained afterwards. The simplest medium to render the surface of the negative suitable for marking upon is made by dissolving white powdered resin in turpentine until the liquid will just flow easily into the bottle. The point of the pencil should be sharpened by rubbing it lightly upon fine sandpaper or ground-glass, and the negative to be retouched is prepared by rubbing upon it with a piece of silk or fine cloth a drop of the medium. The medium should first be placed upon the cloth, and then rubbed lightly upon the negative with a circular movement until the surface is bright and shiny. As the medium renders the film a trifle more transparent by transmitted light, the circular movement is necessary to graduate the edge of the patch

where the work is to be done, and so prevent any hard line or mark being visible. If the pencil will not then mark freely, a little more medium should be applied in the same way. Pencil and plate being prepared, the next thing will be to commence work, in which the beginner will be materially assisted by a rough print taken from the negative. By consulting this print he will see more clearly what should be taken away, and what left. Having decided this point, let him carefully reduce the objectionable spots and patches with the pencil by transmitted light, taking a print from the negative at intervals to make sure that his work is not too glaringly apparent. If this latter be the case, a little turpentine will remove both the work and the medium, and a fresh start will have to be made. A small amount of practice, however, will enable even a beginner to make some improvements in his negative. This, then, constitutes the first stage.

"But," says one, "you have said nothing of style. Am I to work in lines, dots, dashes, commas, circles, curves, or how?" Another fallacious notion. Do none of these, for it is just the careful cultivation of method or style that kills the individuality of the face, as well as the individuality of the work. There is no reason in the world why, in a pencil drawing or sketch, the individual style of the worker should be more apparent than in a retouched negative. Yet it will generally be found that the face itself is of less importance as a face than as a medium upon which to exhibit the method or style dear to the retoucher's heart. It is the cultivation of style that smooths away the wrinkles of old age, re-shapes the features, and otherwise degrades photography as an art. Attempt no style, therefore, but study only to improve the negative, preserve the likeness, and conceal the work. By this means, and through practice, the student will acquire an individual style and touch of his own.

Having acquired a little skill and freedom in the preliminary stage—*i.e.*, the removal of plain defects and blemishes—the student may commence to work upon a slightly different and advanced plan. Supposing, for the sake of illustration, he has a negative of a rather thin and flat quality, it will hardly be advisable to reduce the plain spots and blemishes at first, as by so doing the flatness will be increased. More relief is wanted, and this will be gained by increasing the intensity of the high lights. In this lies one of the methods of emphasising and enhancing the beauties of a face, and a careful study of the rough print from the untouched negative will show those points that will be improved by emphasis. It will, of course, be understood that such alterations and improvements must be made consistently with the rules of light and shade, of which it is pre-supposed the beginner understands something. Bearing this in mind, let him first study the prints and decide upon the points that *he himself* considers beautiful (every face, without exception, contains some element of beauty), and by judicious pencilling increase the intensity of the lights bearing more particularly upon this point or points. True portraiture, it may be remarked, is not only the interpretation of a face, but also the *individual* interpretation. That is to say, the artist's aim should not be merely to reproduce a face, but to reproduce what he himself sees in the face—his own idea of it. Hence the study of the face for that which is beautiful, and the judicious emphasis of the individual idea. Now to follow this out more truly, a certain amount of attention must be given to the muscular and general formation of the face, the pencilling

running in the same direction as the muscle which it affects. Having increased the lights the attention may next he given to the ordinary spots and hlemishes, and after this a general softening (that is to say, the graduating of light into shade) to prevent an appearance of patchiness. In a thin, flat negative this latter (the graduating) must he but slight, and very carefully and lightly done.

It is often necessary in an under-exposed negative to reduce very much the deep black shadows that generally accompany under-exposure. For this purpose it is hetter to use a soft pencil, B or F, and to work first upon the unvarnished film, and again after varnishing ruhbing a little medium on in *both* cases. Great care, however, must he used, or an alteration in the formation of the face may he the result. Should the work upon the two surfaces he insufficient, a little hlue or crimson lake applied with a hrush to the *glass* side of the negative and over the faulty portions will generally have the desired effect. These colours are also useful applied in the same way to the lights or shadows of the drapery or accessories, and even to increase the strength of the high lights in the face. They must, however, be carefully and sparingly used and applied smoothly. This latter will be materially assisted hy the negative heing first coated with matt varnish.

It may be said by some that these are but general remarks, and that a more detailed direction is necessary to the beginner. This is emphatically not so. True retouching, as before remarked, is the result of careful study, and not of teaching. The lightness and freedom of touch must come through practice, and the rest through experience and close observation. None of these things can be taught, and if the beginner—accepting the fact that true retouching upon art principles is the improvement of the negative in assisting the interpretation of a face, and not the improvement of Nature in partially creating one—will devote a little time to practice and observation, both experience and skill must naturally result.

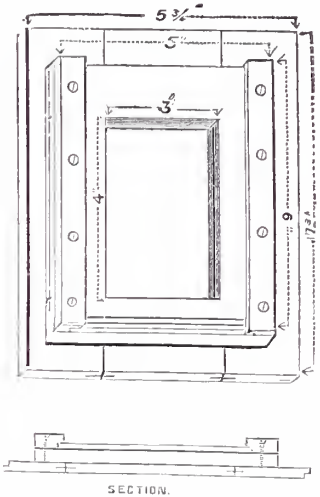
A Carrier for Dark Slides.

By W. E. Daw, Jun.

MANY who have a half-plate camera (I take this size as being the most generally used by amateurs, hut it will apply and can be adapted to any other) often use it for quarters. Perhaps the latter may be the most used, and the larger sized plates exposed only occasionally. How, then, is the best way to carry the quarter-plates?

I shall he told that the most general method is by the use of carriers in the half-plate dark slides, but is this the hest way? It seems to me rather wasteful to spend a lot of extra money on half-plate slides, and then only use them for quarters. Suppose I want to take with me, as I often do, twelve quarter-plates and six halves. I must, if this plan is adopted, buy nine half-plate slides, and, in addition to the cost, look at the extra room these would take up and the added weight to carry. So I came to the conclusion that

quarter-plates ought to be carried in quarter slides, and it remained to devise something for the camera to hold them, so the accompanying design is the result, with which, after using it for several months, I am entirely satisfied. I can't say if it is original; lately nearly everything in photography that has at first been branded as new has after a time been proved to be only a revival of old methods, so very likely someone has used this very method for years. All I can therefore say is that I have never seen or heard of anyone using anything like it.



SECTION.

The carrier consists simply of a frame to fit in the same grooves as the half-plate slides, another frame glued and screwed to the first, and on to that two pieces grooved to carry the quarter-plate slides. Now for the making.

For the first frame take a piece of mahogany $\frac{3}{16}$in. or $\frac{1}{4}$in. thick. Cut two lengths, $7\frac{5}{8}$in. × $1\frac{5}{8}$in, and two 3in. × $1\frac{3}{4}$in. Join by tonguing, as shown in section. The other frame is made of $\frac{3}{8}$in. mahogany, $1\frac{1}{8}$in. in width, two pieces 5in. long, and two 4in. The use of this is to allow room for the fingers to draw the shutters of the slide. It is glued to the larger frame, and velvet fastened to the upper part. The grooved pieces for the quarter-plate slides to run in are then cut and secured on the two frames by screws, and a small piece tacked to the bottom to act as a stop and prevent the slides going through too far.

A focussing glass in exact register will have to be made, and may be fastened by hinges, or slide in the grooves like the screen Tylar sends with his metal slides; in fact, if the slides are not already bought I would advise the metal ones, as they take up such a small space.

Paint the inside a dead black, and varnish or French polish the outside, and the carrier is finished.

Silver Printing on Plain Paper.

By Thos. Earp.

As the result of a few experiments in printing from landscape negatives on plain paper, it appears that very great variety in the colour and general effect of the finished proofs may be secured by using alternatively an English or a French make of paper in combination with certain modifications of the salting solution as specified below.

Starting with a normal solution of five grains of chloride of ammonium to the ounce, a series of varying tones may be secured by the following additions:—(1.) One-eighth grain of bromide of potassium added to the ounce of normal salting solution gives tones nearly resembling platinotype on ordinary French photographic paper. (2.) A further addition of a small quantity of bichromate solution, just sufficient to give a pale lemon tint to the bath, and the use of Whatman's drawing paper, gives rich sepia-like tones. (3) Citrate of soda being then added, to the extent of two or three grains to the ounce, will give very rich warm blackish tones which, for large broad work, is exceedingly effective.

The salting solution should be applied by *immersion* of the paper—say, of some six sheets successively—these being then reversed in the bath, so as to bring the sheet first immersed uppermost, are to be successively removed, passed over a glass rod to remove superfluous moisture, and dried as usual.

The paper in this state keeps well, but, after bichromate has been added, too long exposure to light should be avoided, so as to obviate degradation of the lights in the finished proofs. Sensitising is performed by *floating* the paper on a 50-grain bath of ammonio-nitrate of silver, removing the paper two minutes after it lies flat on the bath, passing over a glass rod, and drying pretty quickly.

Sensitised paper requires to be used as soon as possible, as its keeping qualities are very moderate, and clean pads must be used in the pressure frames.

The *immersion* in the salting bath seems to be of the greatest service in obviating the sunken appearance which often spoils prints on plain paper, and was adopted by me in consequence of my noticing the effect of an accidental splashing of the salting solution on the back of some paper, when being prepared by the usual method of floating.

In selecting the class of paper to be used for particular negatives, it must be remembered that where much fine detail requires to be reproduced, the smooth photographic paper is most suitable, the English drawing paper being employed where breadth and force are the desiderata.

Printing, as is usual with plain paper, must be carried farther than in the case of albumenised paper, as there is rather more reduction in the toning and fixing.

Weak prints indicate want of strength in the silver solution, or, it may be, insufficient duration of floating on the sensitising bath.

The finishing operations are the same as for albumenised paper, but the toning is much more rapid, and the bath need not be so rich in gold.

It may sometimes be found advantageous, as in the case of negatives of shady lanes, where there is a large preponderance of half tones, to use a plain nitrate, or even an acetate-nitrate bath for sensitising, in order to obtain the very best results. In the latter case the bath soon becomes much discoloured, hence no more than is absolutely necessary should be made up at one time.

For general use the salting solution as in No. 2 will be found the most serviceable.

Practical and Simple Tests as Applied to Photographic Lenses.

By Theodore R. Hubback.

IT sometimes happens that a photographer gets a lens which is by no well-known maker, and about whose history he knows little or nothing. Under these circumstances, if he is a practical man, he will most likely want to test it, if possible, before purchasing, and the following simple and easy tests may be of some use to him.

To find the focal length or equivalent focus of any lens the following formula will be perhaps one of the simplest :—

Let p = distance from lens to object.
,, p_1 = distance from image on focussing screen to lens.
,, f = focal length.

Then—

$$\frac{1}{p} + \frac{1}{p_1} = \frac{1}{f}$$

For example, suppose p = 40 feet, and p_1 = 10 inches,

$$\frac{1}{12 \times 40} + \frac{1}{10} = \frac{1}{f}$$

$$\frac{1 + 48}{480} = \frac{1}{f} = \frac{49}{480} = \frac{1}{f} = 49f = 480 = 9{\cdot}8\text{in. focal length.}$$

To find the aperture of a single lens it may generally be taken as the diameter of the diaphragm, but in doublet lenses this is hardly correct.

To find the aperture for a doublet lens place the focussing screen at the equivalent focus, and put in a stop, remove the screen, and in exactly the same position put an opaque card with a pin-hole pierced in the centre. Strongly illuminate this hole by putting a good light behind it. Then look at the front of the lens, and an illuminated circle will be seen. The diameter of that circle will be the available aperture with the given stop.

Spherical aberration is a defect from which lenses sometimes suffer, and is caused by the inability of the lens to bring accurately to a point all the rays which proceed from the corresponding point of the object. To test for

spherical aberration cut out a small square or figure from some opaque substance, such as a piece of black paper. Paste this either on a piece of frosted glass or sheet of paper. Now strongly illuminate the glass or paper so that the contrast between the small figure and the surface shall be very strongly marked. Focus the image carefully without putting in any stop. Now note the definition *very carefully*, and while doing so put in your smallest stop. If there is *any* increase in sharpness of image the lens is not properly corrected for spherical aberration.

Chromatic aberration is the inability of a single lens to bring the differently coloured rays composing white light accurately to the same focus. This arises from the fact that the waves of light are not the same length, red (the longest) being about the 39 thousandth of an inch, and violet (the shortest) being about the 58 thousandth. Any refracting substance through which the light is made to pass bends the blue more than the violet, and, consequently, a converging lens will bring blue or violet light to a focus nearer to the lens than it will red. Consequently, we find an image which is nearer the lens than the principal focus tinted with red, and when further away, tinted with blue. As the refractive power of a body increases, so does its dispersive or colour-producing power, but, fortunately, not at the same rate. By combining a converging lens of suitable curvature with a diverging lens made of a different kind of glass, we are enabled to neutralise the colour-producing power of the two lenses, but to leave an excess of refracting power. Such lenses are called achromatic, because they give images without colour. It is necessary that every photographic lens should be achromatic, and not only so, but that the focus for those rays which produce the visible image should be the same as those which produce the chemical action.

Another kind of aberration is that due to the thickness of the lens, commonly called distortion. This defect shows itself by causing the shapes of bodies to be altered. To test a lens for this defect, which ought only to occur in single lenses, focus a square and note the shape on the screen. If the lens be not corrected, the sides of the square will bulge out like a barrel, when the diaphragm is between the object and the lens, but should the diaphragm be between the lens and the screen, then the sides will curve inwards.

A lens may suffer from astigmatism, or the inability to focus vertical and horizontal lines at the same time with equal exactness. To test for this defect, draw on a sheet of plain paper a few vertical lines, and cross them with horizontal lines of the same thickness. Place the paper in a good light, and focus the vertical lines very carefully. Now note whether the horizontal lines are of equally sharp focus; if not the lens suffers from astigmatism. This defect is reduced by the use of diaphragms, and by making the spherical surfaces of the lens such that the incident and emergent rays make very small angles with the normals to the spherical surface.

Curvature of the field.—Another defect is caused by the circumstance that the plate on which the image is formed is flat, and cannot include all the foci formed by the lens, because the oblique pencils of light which pass through the lens are brought to a focus at a less perpendicular distance from it than are the central ones. A simple experiment to test a lens is to focus a large chess board, when, if the centre is accurately in focus, the marginal ones will be ill-defined if the lens is improperly corrected. Correction is made

by combining proportionately curved converging and diverging lenses, and by the use of diaphragms.

A simple experiment to determine the depth of focus of a lens, which is the range in a perpendicular direction from the lens, within which all bodies are equally well focussed, and at the same time to test whether the visual and chemical foci coincide, is arrange a number of squares of cardboard with figures printed on them, one behind the other, in the shape of a wedge, with spaces of some small distance, say $\frac{1}{4}$in., between each. Now fix the camera in such a position that the slope of the wedge may be inclined to the axis of the lens, and accurately focus one of the central numbers on the ground glass. Observe the other numbers, both those in front and those behind; they will gradually decrease in definition as their distances from the number focussed increases. The perpendicular distance between those which are well defined gives the depth of focus. Now, to test the chemical focus while the camera is in this position, expose and develop a plate, and note the numbers again. If the one which was previously focussed comes out with the best definition, both foci coincide, but if some other number shows out better, that is the position of the chemical focus, and hence its distance from the visual focus can be found.

Finally, when we have placed in our hands even one of the best lenses, it must not be supposed that it is perfect. It is impossible at present to make such a lens, for sometimes the corrections for one kind increase one of the other kinds of defect. The best lenses are those which reduce the total defects to as small a quantity as possible, and I may conclude by saying that the best lenses of the best makers are really wonderful productions, when the whole difficulties are taken into consideration.

A Use for Smoke.

By H. M. Hastings.

WHEN making slides one unfortunately often meets with a negative which, while capable of yielding a pleasing transparency, in other respects is marred by some high light in a wrong position spoiling the effect, and although by the use of coloured varnishes, tissue paper, etc., applied to the back of the negative, or other means, the great contrasts may be reduced, a large amount of trouble is involved which is often not thought worth while incurring at all, unless the slide is required for the completion of a series. I have tried several ways to overcome this difficulty, and at last found the following method, which has helped me considerably, as it is so quickly carried out. Of course it may not be new, although I have never heard of its application in slide-making before, but I venture to send an outline of it to the Annual, at the same time claiming the indulgence of any reader to whom the idea may have occurred of resorting to such an expedient.

After making the best slide you can, which should be preferably of a slightly warm colour, for reasons I will give later on, and preparing the mask, place the cover glass to be used *at the back* of the slide, holding both together

by the edges between finger and thumb at an angle. While in this position bring a lighted wax match underneath, and allow the flame to deposit a thin film of soot on the cover glass, immediately under the objectionable high light in the slide itself. Having done this, place the two glasses on the retouching desk, smoked side towards you, taking care both slide and cover glass register exactly, then by means of a small brush remove the deposit of soot from those portions of the glass where additional density of slide is not required. As a rule the half-tones surrounding the high light will allow the soot to be thinned away, without causing anything noticeable to be observed when the slide is viewed on the screen, and if moderate care has been employed there is very little chance of the dodge resorted to being detected. Should the deposit be found too thick, or a mistake have been made in removing the superfluous deposit, wipe the glass clean and repeat the operation of smoking it. In my own experience I find it best to allow the flame to impinge on the glass *below* where I require the increased density, as the fringe of the deposit of soot is much thinner and more even than near the point of contact. It is also advisable to warm the cover glass gently first, to avoid the deposition of the water produced by the flame, which would otherwise condense. Having completed the removal of the soot, and cleaned the rest of the cover glass, reverse it and place in proper position on the slide; the deposit will then be in between the two glasses, and protected from rubbing by the interposition of the mark, and can then be bound, care only being taken to keep the glasses in register.

That the colour of the slide should be preferably a warm one will be readily understood when it is remembered that all these deposits of soot, whether caused by burning oil, wax, camphor, or anything else depositing carbon in this way, have a great tendency to give a warm coloration when viewed by transmitted light. A colder deposit may, however, be obtained by keeping the flame further away from the glass, but it will, of course, take longer than in the former case.

In conclusion, I should like to add that I do not wish it to be thought I advocate this method for the improvement of a slide faulty through wrong exposure or improper development, as it is intended only to be employed in those cases where undue contrasts exist in the original negative itself, and which cannot be rectified except by a great amount of trouble.

A Practical Chat upon Dark Rooms.

By John A. Hodges.

SINCE first taking up the practice of photography, a period now rapidly approaching two decades, the opportunity has, not unnaturally, occurred to the writer of visiting the dark rooms of a great many photographers, and he has, consequently, from time to time noted the conditions under which they work, and, as the result of such observation he is led forcibly to the conclusion that those who provide themselves with suitable and proper appliances for comfort in working, generally produce the best

work. At the same time he has not forgotten the old adage about a bad workman and his tools, and is fully aware that good work is sometimes produced under extremely adverse conditions. Indeed, he is personally acquainted with a well-known exhibitor and prize medallist, whose pictures, if not exactly produced in the wash basin, are certainly brought into existence in his bedroom, in which apartment all his photographic operations are conducted. Working in such a manner, however, certainly does not conduce to the easy production of uniformly perfect negatives and prints, and the first aim of the would-be photographer should be to secure, for his own exclusive use, an apartment which can be converted into a dark room. The object of this article is to describe the fitting-up of such a room for practical work, and, further, for the benefit of those whose circumstances debar them from the luxury of working in a room specially devoted to the purpose, to show how, at a very small cost, a convenient developing table or cupboard may be easily constructed, the use of which will greatly tend to comfort in working.

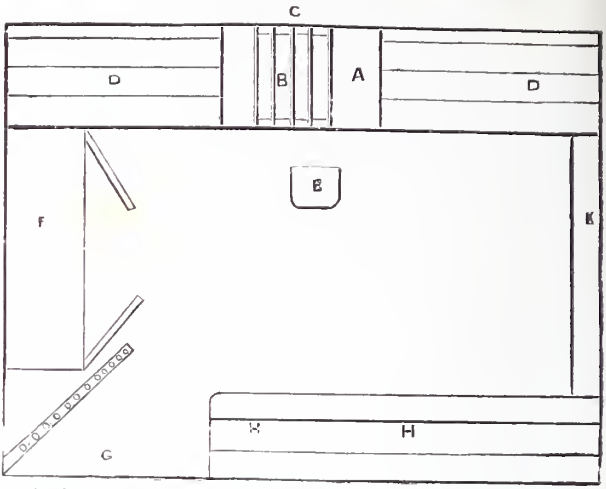
Being himself somewhat of a migratory disposition, it has happened that the writer has had occasion to shift his quarters from time to time, and the experience so gained he proposes to place before the readers of PHOTOGRAPHY ANNUAL. He would at the outset strongly advise the reader not to attempt the construction of a wooden temporary structure out of doors, the practical discomfort of working in such a dark room cannot be over exaggerated. The writer once spent a considerable amount of time and money in erecting such a dark room, but owin to the heat in summer and the cold in winter it was almost impossible to work in it.

An apartment, preferably in the upper part of the house, should be chosen, lighted, if possible, by a window facing east or north-east. The room need not be large, if it can be appropriated to the exclusive use of the photographer, but a determined stand should be made against any attempt on the part of the household authorities to make it serve in the dual capacity of lumber room and photographer's dar room. For the sake of illustration it may be assumed that the floor space measures about 12ft by 10ft, the height from floor to ceiling being 9ft. Such an apartment would afford ample space for comfort in working. The developing sink should be fixed immediately under the window, and a bench should run the entire length of that side of the room. Its height from the ground should be such that the operator, when seated (as he should be when developing), can easily manipulate dishes, etc., without stooping. The sink should be sufficiently large to avoid slopping; the writer's measures 36in. by 20in., and is 8in. deep. Zinc is a convenient and cheap material of which to construct it, and if thick is fairly durable, but an occasional coating with "Aspinall" will prolong its life. A fillet of wood or metal should be fitted inside, about an inch below the top, upon which a wooden grid should slide easily, so as to readily push out of the way when washing negatives or prints. An effort should be made to get water laid on, as without it the dark room can scarcely be said to be complete. The tap should be over the middle of the sink, but not placed so low down as to be in the way when it becomes necessary to stand a large basin or other vessel in the sink. A short length of indiarubber tube provided with a fine rose which can be easily slipped on and off the tap affords an effectual and simple means of washing negatives. Where a constant supply is available it is better to connect with the main, as the water may then, if neces-

ary, be allowed to run all night without fear of emptying the cistern. n this connection it may be well to point out that the waste pipe from he sink should be of large diameter, certainly not less than an inch nd a half, and provided with a perforated grid to prevent clogging nd a more or less disastrous overflow. If the sink is firmly fixed on uprights its sides may be utilised as the supports for the bench which should extend on either side. The space underneath the sink should be left free, so that the operator may stretch his legs, but that underneath the remainder of the bench may, with advantage, be utilised as a cupboard on the one side, and a draining rack and stand for dishes on the other. Dishes should invariably be well washed immediately after use, and solutions never allowed to stand in them, otherwise the enamel is likely to suffer, and contamination result when next they are brought in for another and possibly different use. An upright draining rack is easily constructed and is a great boon. It would be well for the tyro if he were to take as his guiding motto the well-known but oft-neglected advice, "A place for everything and everything in its place," for a rigid adherence to this axiom would assuredly tend to pave the way to ultimate success. A roomy cupboard and a tier of shelves may be said to complete the general arrangements of the dark room, There are, however, one or two minor matters yet to be dealt with, and one of them is the fixing bath. Nine photographers ont of ten, probably, use a flat dish, but a vertical fixing bath is far more convenient; the luxurious may purchase one of the grooved porcelain vessels specially constructed for the purpose, but an old porcelain silver bath of a size large enough to take the plates ordinarily used, makes a capital substitute. The ordinary form of dipper, by which the plate is raised and lowered in the bath, is a most vexatious piece of apparatus, generally allowing the plate to slip off at the moment of raising after fixation; but a strip of vulcanite 2½in. broad, one end of which has been softened by heat and gradually bent over in the form of a hook, will hold the plate securely, and will last a lifetime. The most convenient place for the vertical fixing bath will be at the left-hand side of the sink. It sometimes happens that it becomes necessary to suddenly leave the dark room, possibly during the development of a plate, and to meet this exigency there should be a small locker or cupboard underneath the bench to the right of the operator, into which the tray containing the negative and developer can be placed in darkness and security, while the door of the dark room is temporarily opened.

We have yet to decide upon the illumination of our dark room, and if the room be provided with an ordinary window admitting daylight, the matter will present no great difficulty. Two grooved pieces of wood should be screwed to the top and bottom of the window, in which a wooden frame, the full size of the window, can slide easily backwards and forwards. This frame must be first covered with canvas upon which strong brown paper should be pasted; when dry, on opening, about 18in. square should be cut out, over which aperture the non-actinic material is to be placed. If the window is so situated that the direct rays of the sun fall upon it, then ruby glass with additional screens of orange paper inside forms the best non-actinic media, as fabric, or paper of any kind, rapidly bleaches under the action of sunlight; otherwise the writer prefers for ordinary work one thickness of ruby paper with one thickness of orange paper superimposed. Such

FIG. 1.



A—Sink.
B—Grid.
C—Window.
D D¹—Bench.
E—Stool.
F—Cupboard.
G—Door.
H H¹—Bench.
K—Shelves.

FIG. 3

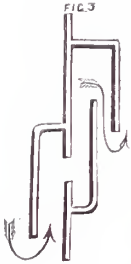
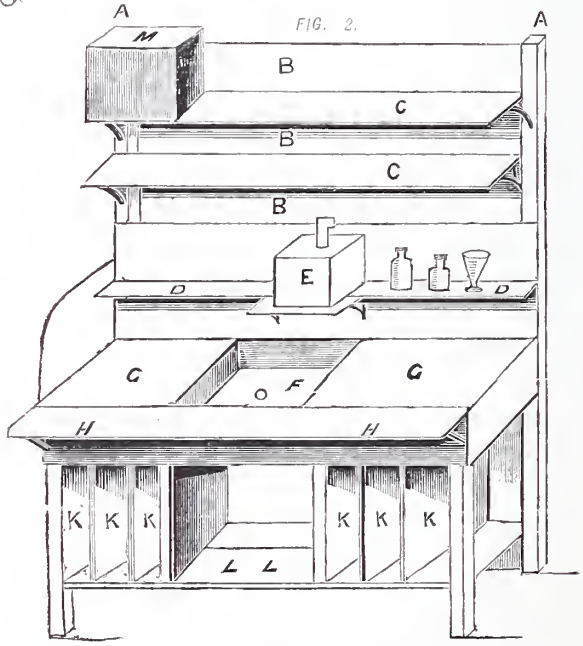


FIG. 2.



A A—Uprights.
B B B—Back.
C C—Shelves.
D D—Small shelf.
E—Lantern.
F—Sink.
G—Bench.
H, H—Board to widen bench.
K K K—Divisions for rack for dishes.
L L—To be cut away.
M—Tank.

light, however, would not be safe for Isochromatic plates, which require to e manipulated in dull ruby light. It is unnecessary to add that all chinks nd crannies admitting white light must he carefully stopped up, and it is ot until after one has been in a darkened room and one's eyes have become ccustomed to the darkness, that one realizes how difficult a matter it is to fficiently stop out all extraneous light. At the same time provision must be nade for ventilation. In an ordinary apartment, provided with a fireplace, he chimney will, perhaps, afford sufficient egress for the vitiated air, otherwise it will he necessary to put ventilators on the door or in some other convenient place. The nature of their construction is shown at fig 3, and local circumstances will determine where they may best be placed. The importance of this question of ventilation is very generally overlooked; many photographers not giving it consideration. That this should be so is extremely regretable, as confinement in the vitiated atmosphere of an ill-ventilated dark room is a matter of serious consequence to the health.

Having shown how an ordinary room may he converted into a dark room, it now remains to describe how a portable and convenient developing cabinet may he easily and cheaply constructed by the reader, if he possess a little mechanical ability, or by an ordinary carpenter. As a basis for operations, a common wooden washstand should be purchased from a second-hand dealer of the pattern shown in the drawing. The circular opening in the middle must, with the aid of a keyhole saw, be cut out square, and a zinc tray fitted in—this will form the sink. Before it is fixed in position a hole must be bored in the bottom, and a piece of pipe about 6in. long soldered on; to this may be attached a suitable length of flexible tubing, which will conduct the waste solutions, &c., into a pail or other receptacle placed to receive them. Two uprights, A A in the drawing, 6ft. long, are screwed to the back legs of the washstand, and the whole of the back can then be fitted in by nailing to them thin ¼in. boarding. The average depth from back to front of an ordinary washstand is about 18in., which will scarcely give sufficient room for comfortable working, therefore a piece of board about 10in. wide and the length of the stand should be firmly screwed down to it. A narrow shelf usually runs the length of the stand; this may he allowed to remain, but two more shelves, about 6in. wide, should he fixed, with angle brackets above it. The existing shelf should have screwed upon it, in its centre and over the sink, a broad piece of wood, upon which the dark room lamp can firmly stand, The false bottom, which is usually found in washstands, must be cut away in the centre to allow room for the legs of the operator, the sides being strengthened by additional uprights, marked B B; the two spaces so obtained should he partitioned off, and converted into racks for dishes. A pail or other vessel containing clean water may be placed on the upper shelf at W, and conducted to the sink by means of a syphon and spring clip. When all the woodwork is completed, it should receive two coats of Aspinal enamel, and the partition at the back should be papered with thin Willesden paper, which will make it at once light tight and durable. If it is intended to work only after dark, or if the window of the room can be temporarily darkened, nothing remains to be done, and the reader has, at a practically nominal cost, a piece of apparatus that will enable him to work in cleanliness and comfort, and save him from the wrath of those who reign supreme in matters domestic.

If, however, it is desired to use the developing table during the day-time it will be an easy matter to devise means to shut out actinic light. Two iron curtain rods, 4ft. long, must be affixed in tin sockets to the uprights. These rods must be bent as shown in the diagram, and the ends squared to avoid slipping; a third rod the length of width of the table will complete the roof of the structure. Sufficient black material, of the kind known as "twill" or "Silesia," to amply cover the top and the sides must be obtained, together with a like quantity of yellow, with which it should be lined. The stuff should be cut so as to make two side curtains large enough to extend from the sides A A to the middle of the back B B B. These should be tacked to the uprights B B, and so run on rings round the rods, and be at least 6in. on the ground. The bottom should be hemmed, and the hem filled with small shot. This will ensure the exclusion of the light at the bottom. The top is simply a plain piece of material large enough to cover the roof, and hang down 6in. all round. It is put on last, and secured by tapes.

The writer has now endeavoured to describe, in as simple terms as possible, a dark room such as he has fitted up himself, and a developing table which he has constructed out of precisely similar materials to those which he has mentioned. If any point of detail requires further explanation or elucidation he will be glad to answer any queries addressed to him through the Editor.

A Portable Dark Room, and How to Make it.

By Amateur.

WHEN writing my paper on a portable studio, the thought struck me that a similar paper on a portable dark room might be useful to those who travel about the country, as a great many do both for amusement and profit; but when I mention the word portable, I do not mean that the dark room which I am about to describe can be folded up and carried under the arm, but rather that it can be packed in a comparatively small space, for convenience in packing and removing from place to place, while, when erected for use, it will be as rigid and convenient to work in, and quite as safe as regards being light-tight, as the ordinary dark room. Unlike the studio mentioned above, there are no loose parts in this, with the exception of the shelves, and they are fixed on the sides in such a way for travelling that it is impossible for them to become loose, so that it may safely be said to be complete in itself.

Without wasting any more time and space, I will proceed to describe the drawings in as clear a manner as possible, so that there will be no difficulty in the way of the veriest tyro at joiners' work in building a dark room for himself.

Fig. 1 shows a perspective sketch of room complete, and fig. 2 shows the plan of same. To make it we shall need the following materials, which are

calculated for a room four feet square and six feet high at the lowest side—that is, where the door is, the roof being made about six inches sloping, so that the wet will run off easily, and the door being placed in the lowest side for a reason which will be given hereafter.

List of Materials Required, and Prices of Same.

	£	s.	d.
300 square feet of half-inch match boarding, at 7/- per 100 ft.	1	1	0
Two pieces 6ft. long 2½ × 2½ yellow deal, at 1½d. per ft. ..	0	1	6
Two ,, 6½ft. long ,, ,, ,, ..	0	1	7½
Six pair 12in. T hinges	0	3	0
Three pair 2in. shutter flaps	0	1	6
Door fastenings, nails, screws, &c.	0	3	10½
Twenty-four feet one-inch pine, for shelves, &c., inside ..	0	6	0
Ruby glass	0	1	6
Total	£2	0	0

Having got the materials to hand, we will proceed to work. First take the four corner-posts—that is, the four pieces of 2½in. × 2½in. yellow deal, and rabbet them on two sides half-an-inch deep, and on the post half the width of the side, which will be 1¼in. A section of one of these posts is shown in fig. 3. Now cut off sufficient boards to reach 8ft., 6ft. 6in. long, and nail one into one of the rabbets in two of the posts, the tongued edge of the board in one post and the grooved edge of another board in the other. Then lay the two posts on the bench or flat on the ground, and fill them in with the other boards until they are of the requisite width—that is, 4ft. or about; an inch or two over or under does not matter, but the boards must be brought in evenly, so as not to cut any of them. Now take the other boards and place one over each joint, and nail them firmly together, filling in at the posts with a narrow piece. The ground plan, fig. 2, shows each joint, the side marked A being the one just described. A narrow piece can now be nailed along the *top* to keep all stiff, and the whole must be turned over and a piece nailed along the *bottom* on the other side, this piece also being nailed to the corner posts. This piece is shown at B, fig. 1. The other side can now be made in the same way, only it will be 6ft. high, and the joints of the door must not be nailed together. These joints are shown in fig. 2 at C, C, C, C, and a narrow piece must be nailed along both *top and bottom outside*, not fixing them to the door, of course, but keeping the door in its place while they are being nailed on, so as to ensure it being the correct size. The next thing to be done is to make the folding sides. This is done in the same way as the others, only the boards are not nailed to the posts, but must be made so that the outside board just fits in the rabbet as before, and two of the joints must be left loose in the middle. These are marked D, D, D′, D′ in fig. 2. The boards must be so arranged that the outside joints, D′, D′, are exactly in the middle, and the inside joints, D, D, must be left loose in opposite directions, as shown in the drawing. This is for convenience in folding. Now cut off the tongue of each of the loose joints, and laying one of the sides in position on the bench, face side up, hinge them together with the flap hinges. See D′, D′, figs. 1 and 2. (I omitted to state that the sides

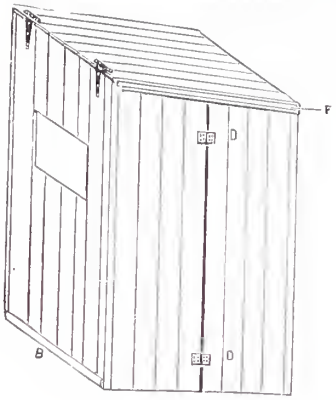


FIG 1

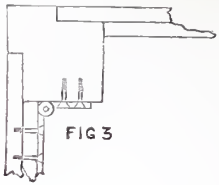


FIG 3

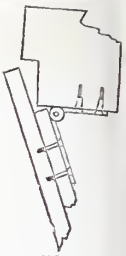


FIG 4



FIG 6

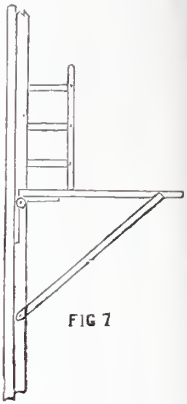


FIG 7

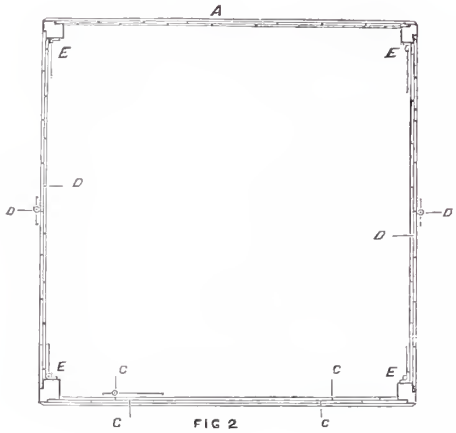


FIG 2

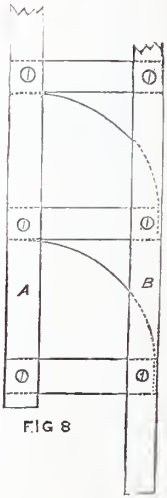


FIG 8

FIG 10

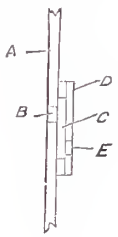




FIG 9

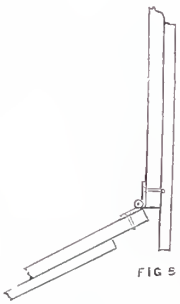


FIG 5

EXPLANATION OF FIGURES.

Fig 1 Perspective sketch of dark room.
" 2 Ground plan of ditto.
" 3 Detail of one corner.
" 4 Ditto in act of folding.
" 5 Centre joint, partly folded.
" 6 Cleats to hold shelves.
Fig. 7 Developing bench and shelves showing mode of fixing.
" 8 Detail of folding shelves.
" 9 Slot in shelf to hold same when packed.
" 10 Section of ventilator

must be made to slope at the top from 6½ft. to 6ft., and must also be made as a pair; that is, to both slope one way when placed face to face.)

The sides must now be hinged to the corner posts; to do this screw them temporarily into the rabbets, and while fixed there screw on the T hinges *inside*. See fig. 1, at E, E, E, E.

Now take out the screws which hold the hinged side, and it will be found that on pressing the middle of each side inwards the whole will fold and lay compactly together.

We will now make the roof. This is made of double board in the same way, and must be made to the exact size, and a narrow piece nailed on round three sides; that is, every side except the highest one, and here it must be hinged with a pair of T hinges. See fig. 1, in which one piece is shown at F. The door can now be hinged inside, and, as will be seen, the wide rabbet formed by the over-lapping boards at the sides, and the narrow piece outside at top and bottom, will effectually shut out the light. A piece can now be cut out of the front, and the ruby glass inserted, and fixed in with small slips both inside and out.

The dark room is now finished, as far as the main part is concerned, and we will now arrange the inside fittings. The first of these, of course, will be a developing bench; this can be arranged as in fig. 7, the bench itself being hinged to the boards, so as to fold down between the corner posts, and the stays which hold it up for use being screwed to the corner posts at such a distance below bench as not to interfere with the latter when folded down, the whole is clearly shown in fig. 7. Shelves can be fixed on the folding sides by means of cleats, similar to fig. 6, one of these being screwed on front and back for each shelf, which, dropping in the recess, keeps the whole side firm, and when the room is to be packed up, the shelves can be lifted out and fixed on the inside of the door by means of a screw in the door and a small slot in shelf—as shown in fig. 9—the round hole is slipped over the head of screw, and then the narrow part of slot slips down over shank of screw, and the head holds the shelf firmly in its place. Small shelves can also be fixed on bench at each side of window, as shown in fig. 7, and in detail at fig. 8. To make these, take four pieces of hard wood half an inch square, and the length according to the number of shelves required, screw them to the ends of shelves as shown, keeping each shelf the same distance above the next below it as it is wide, then screw the back end piece (A, fig. 8) to the front boards of dark room, at the proper height, so that the front end piece (B, fig. 8) will rest on bench and hold the shelves level. When packing up, all that is necessary is to lift the front of shelves, when they will fold away into an inch of space, and can be held there by a small button. The curved lines in fig. 8 show the path of the front of shelves when being folded. As a dark room without ventilation cannot be considered complete, we must now arrange for the inlet of fresh air, and the outlet of foul air; the inlet is best under the developing bench. First bore a row of half-inch holes through the front, then take a piece of thin board, about six inches wide, and nail it on to a frame about half an inch thick, first boring a row of similar holes in it, then screw the board on inside so as to cover the other holes, taking care that they do not coincide with each other; this will let in plenty of air, but no light. The outlet must be done in just the same way, but the best place for it will be at the top of the door. Fig. 10 shows a section of this ventilating arrangement, A being the front of

dark room, B the holes in the same, C the air passage formed by the half inch frame, D the covering board, and E the hole in same.

Our dark room is now finished, and I hope I have made every detail sufficiently plain, so as not to cause any difficulty in its construction. It could have been made lighter by using paper instead of so much wood, but it would have been more difficult to keep the light out; so altogether I think I can safely say that for a good, durable, dark room you cannot beat it at the price.

I have not said anything about painting or varnishing, as that must be left to each individual builder, but I must say it would be much better not to be left undone altogether.

If required, the roof could be formed into a water cistern, without much trouble, by having a wide rim round the sides, and lining it with lead or waterproof paper, the same as I recommend in my paper on the studio.

As will be seen, the reason the roof is hung on the highest side is that, when the whole affair is packed the roof folds down and protects the window, which otherwise would stand a fair chance of getting smashed at each removal.

"COPIES"—AND WHAT TO DO WITH THEM.

By "The Lady in the Reception Room."

IN the course of our professional career and consequent insight into the various methods adopted by different operators in accomplishing the manifold branches of our most interesting and delightful art, we have had considerable opportunity of observing the diversity of opinions prevailing among them upon most subjects, more particularly so upon that of "copies," and it is with the object of endeavouring to convey some idea of the little ways and means adopted for improving these very often unpleasant tasks that are set us in the course of business that we shall dilate, with what ability we may, upon these "copies," and what to do with them, and could we succeed in imparting but a trifle of that enthusiasm with which we personally regard this branch we should consider ourselves as amply repaid.

The average photographer, who is blessed with a good run of the everyday and commonplace class of business, affects great contempt for "copies," and regards them and their manipulation, as a rule, more of a species of hindrance and waste of time than as an interesting, and not to mention profitable, variation of the ordinary routine of the studio. He in many cases entirely refuses to undertake them, knowing the results to be so frequently unsatisfactory; or, if he does condescend to oblige his customers, finishes off his efforts upon specially printed mounts which aggressively announce "that this photograph must not be taken as a specimen of his usual work," etc., etc., thereby, of course, insinuating to the observant recipient that his studies from life are so immeasurably superior. This pompous individual

will also take great pains to inform his patrons that he cannot promise to offer them anything equal to the original in question—it may, in fact, be decidedly inferior, unless they order an "enlargement"—which his "special artist" (club, *solid* oil, 4/6?) will render absolutely life-like, and so on. Alas! that we cannot all afford to be so independent.

To the impecunious and struggling photographer, possessed of one lens only, "copies," of course, mean considerable inconvenience, more or less according to the materials and subject on hand. And we have witnessed with astonishment the make-shift "extensions" to the ordinary camera improvised by these unfortunate individuals, ranging from the baby's bed-quilt to the "missus's" shawl, supported by props of firewood or anything else that came handy. And it always follows that just as this temporary paraphernalia is rigged up to their entire satisfaction they are interrupted by a "bit of a sitter" who requires tbe large order of "three for a shilling," when down has to come the rickety structure wholesale; therefore it is not to be wondered at that copies in *these* establishments are more often "drat'ed" than otherwise. With a little forethought, how easily all this annoyance could be avoided by constructing a permanent "extension" out of common cardboard, staining it inside and out with ordinary lamp-black. Any trouble entailed in the manufacture of this article is, we beg to inform our readers, amply repaid by its all-round utility in the studio, for in the hands of a man of recourse we have seen it figuring as a vase for flowers, a "pot hat" on a "nigger," a lady's footstool, and a capital for the property balustrade.

Leaving the question of the most suitable instruments for copying purposes to wiser heads than ours, as the understanding feminine is not capable of defining the merits of any in particular, we will keep to what we *do* comprehend, and see how we can improve and prepare our photograph ere we hand it over for reproduction. "Prepare!" we fancy we hear some echo, "what preparation can be necessary when we have merely to *copy?*" And we venture to assert that it is in this neglect of some slight preparation that the secret of so many unsuccessful attempts lie, as most photographers never do anything but "stick it up" and "fire away," hardly stopping to dust it even—thus causing endless trouble and waste of time to the patient "spotter." Looking it over with a view to saving work upon the negative does not enter their thoughts either, for is not that the retoucher's business? and so is relegated to spotter and retoucher what really should be performed by the operator. We have met with so many, clever and patient to a degree, and up to every "dodge" for improving copies *after* the negative is taken, who do not exert their ingenuity upon any preliminaries at all: to such as those, therefore, and for the saving of time to all concerned, we offer some ideas for their subsequent benefit. The faded and cracked "glass picture," the bent and battered "tin," the bethumbed and yellow card, the extracted head from the everlasting school group—do we not know and struggle with them as of old? And although we are told upon all sides that photography's motto is *still* "Excelsior!" yet the merest glance through the "copying" box of an average studio would lead us to considerably doubt that statement. If photography *is* improving, where do all these dreadful things come from? But as exclaiming at them or refusing to take them in is no way out of the difficulty, let us "enthuse" upon the subject, and regard them in the light of

so many interesting experiments that, successfully treated, can only redound to our credit.

In most studios "spotting colour," *i.e.*, Indian ink and carmine, brushes, Chinese white and gum-water are to be found, and in these articles we have all that are needed, for we must bear in mind what we do is for our own benefit during copying—to be removed when the negative is satisfactory—therefore should be carefully done, and *in water* colours only, that no trace of our handiwork may be discovered when returned to the owner, in whose eyes, at least, these wretched pictures are often priceless.

The faded yellow glass positive or Daguerreotype is a very good test for our ability, and if we do not possess sufficient courage to experiment thereon with any of the mystic solutions contained in the dark room, in which, occasionally, the possible chances of improvement or entire obliteration are about equal, we proceed to strengthen and remodel the whole picture with our useful "spotting" colour, tracing out the outline, sharpening up waves of hair, pupils of eyes, defining the lips, buttons, and folds in clothing, &c. Should our positive be protected by varnish we can further improve it by giving the face and hands a wash of gum-water, and putting a few touches of white thereon before it is quite dry. Dark cracks can be filled in with the white, just tinted with spotting colour, and places where the film has vanished through old age can be filled up evenly. All these touches should be most carefully and lightly applied, or the resulting copy may possibly present an unpleasant hardness, but anyone acquainted with the delicacy requisite for "spotting" will be able to accomplish it easily, and we feel certain that operators attempting, and succesfully so, to thus improve an old positive by the foregoing simple method will be so pleased with the effect that they will almost regret having to remove it.

Our old friend the tin-type requires a somewhat similar treatment, though, as a rule, how to relieve some of the dense blackness, which is the prevailing tone of these "artistic" objects, is the question here; for these "tins" are usually mementoes of some "cheap tripping," and taken as a fitting *finale* to a festive day by some despairing "mug-faker," who has hardly sufficient light left to focus by. When these things are presented—as all that remain to remind them of a lost one—we are exasperated at the whole race of mankind, and wish with all our heart that the powers that enforce compulsory education would also enforce compulsory photography, as it really is a duty that we all owe to society at large, and our own family circles in particular, to support photography, and see that we leave respectable representations of our lineaments behind us.

When the backgrounds of these tins are so dark, and surroundings obscured, a good effect is obtained by lining out imaginary curtains, or panels, with a brush full of white; also revealing folds in clothing, pockets, cuffs, &c., by the same method. If very much bent, care should he taken to render them as straight as possible before touching up, by laying them face downwards upon something soft, and treating them *à la* "rolling-pin."

We wish we could reproduce, for our readers' benefit, a very bad case of "battered tin" that we have just finished preparing for the operator. It originally represented a group, but, through the various vicissitudes that seem to fall to the lot of the genus ferrotype, all is chaos, saving the shadowy outline of a lady's head in the centre, which resembles more a bad attempt at

"spirit" photography than anything tangible. This precious fragment is all that remains to a disconsolate widower to remind him of past happiness, and, if anything could be extracted from it to resemble the departed, he would be good for a considerable order. Now, as there was so very little to work upon in this instance (the suggestion of a bonnet, being the most prominent "feature"), and it would be decidedly risky to touch the original, the operator enlarged it to a two inch head, and took a print off as a preliminary. As this print was our own, to spoil or otherwise as it might happen, we first slightly defined the imaginary outlines of the features that remained to guide us with our spotting colour, and, when sufficiently strengthened, went more boldly to work with black and white *oil* colours, as being of greater density and more easy of manipulation into the gradations of the lights and shadows. Oil colours for this purpose should be kept as dull and "matt" as possible, and thinned with turpentine only, as if diluted with megilph or the other mediums are apt to dry with a gloss that would seriously inconvenience the operator when recopying. The very black surroundings of this particular head we blocked entirely out with the white, softening off each side into delicate "clouds," adding a little black to get a greyish tint. The good effect gained by this combination of oil and water colours can be imagined, especially when the result was so satisfactory as to lead to several dozens of "cabinets" and a "black and white" from what had been pronounced as a "hopeless case."

The next upon the list of our enemies—the faded and yellow silver print—can often be "accentuated" with our useful spotting colour, aided with judicious touches of Chinese white on lace or high lights—and, in vignettes, "clouds" can nearly always be introduced with advantage, as the old-time photographer (whose relics these subjects generally are) evidently affected perfectly white backgrounds, and a little shading introduced ere reproducing certainly gives it more of a "body." If very yellow and faded, placing it in a printing frame under pale blue glass will considerably neutralise that unpleasant tone, and, consequently, benefit our negative.

The use of this same blue or green glass for copying purposes is not half appreciated amongst us as it ought to be; either inserted in the camera, or placed over the object to be copied, it is equally successful, and should find a place amongst the appointments of every studio.

In copying and enlarging figures from groups, almost every person we have met rely upon the "blocking out" of surrounding objects upon the negative, and, unless carefully accomplished by intelligent workers, has a singularly hard and "cut out of cardboard" appearance upon the subsequent print, which can be avoided by "blocking out" upon the *original*. Use the Chinese white liberally and thickly, as far over the picture as required, softening off with grey tones towards the head. With the spotting colour we can carefully erase the other people's hands, that nearly always repose upon the shoulders of figures to be copied. While upon this question we could sincerely wish that in posing groups operators would kindly give a thought to the possible exigencies of the future, and refrain from making the shoulders of those in the foreground the resting-places for those behind.

This subject of "copies" being one upon which we personally feel great interest, we could in our endeavours to make the best of them take up more valuable time and space than would, perhaps, be appreciated. Suffice it to

say, that in these little photographic perplexities, as in most others through life, the old adage still holds good, that "Where there is a will there is a way," and, although many might point out that these hints and suggestions savour more of work generally entrusted to the photographer's artist than that of the ordinary operator or assistant, yet we scarcely think anything we have referred to would be at all difficult of comprehension, when so many of us subscribe ourselves as "art" photographers, and, trusting that these little ideas which we have tried to set forth may meet with the approval of our readers, we take our leave of them, wishing all interested every success with their "copies," and the question of "What to do with them."

A Few Practical Hints on Pictorial Composition in Outdoor Work.

By Rev. F. C. Lambert, M.A.

WE all know, only too well, how the best story may be ruthlessly murdered by being badly told; and, also, how a good storyteller can hold us entranced simply by his way of "putting things."

And, after all, what is a picture but a story of some sort, appealing to the eye instead of through the ear. Who does not know how some "bit" may be rendered by two different workers in a way so entirely different from each other that it requires some effort to believe that they both had the same materials before them, and yet have produced results with so little in common.

The same incident or scene may be described, told, painted, photographed, sketched, by half-a-dozen equally honest workers, and yet they may produce not one, but six, vastly different results.

Word-painters (from Homer downwards) have always (and rightly) exercised every care in selecting and clothing their stories in an appropriate and becoming dress, so as to be as "telling" as possible. The eye-poet must, in like manner, use every care in selecting and arranging (*i.e.*, composing) his material with a view to making his story not only intelligible, but also as "telling" as possible, otherwise his story is destined to prove "flat, stale and unprofitable."

Well, then, let the photographer gather a hint from the storyteller, be he historian or poet, the interpreter of fact or fiction.

A. Observe, then, that the first condition of success demands that the thing told, painted, photographed, &c., be worth recording. It must have a point, a *raison d'être*, otherwise the result will only be an ass in lion's skin. In other words, before exposing a plate, be sure that the scene is worth the subsequent trouble of developing, printing, &c. Have in your own mind some measure of reason for your selection. It may be a pastoral incident, a bit of river-bed with water-worn rock telling its tale of the past, a bit of open, flat moorland, without the sign of human life—a very picture of lonely,

uncultured isolation, desolation, &c. Whatever the nature of the scene you fix upon, the point of view, &c., let it be your own in the sense that you are doing it because you yourself see its beauty and worth, and *not* because it resembles Smith's or Jones's recently-medalled picture. First and foremost, then, be honest with yourself, and let your subject be your own, and not a feeble imitation of someone else's work; and have some sort of reason to give yourself (though, perhaps, you cannot exactly put your reason into definite word form), yet there should be something like a reason why you fix upon that particular view in preference to another.

B. Having settled upon a certain scene, and knowing that you wish to express some general direction of thought, *e.g.*, spring shower, coming storm, &c., the next thing to consider is—how can this be done so that others may see the scene, as it were, with your eyes? Some slight mental analysis will at once suggest that there are present certain features—an old tree, rock, gleam of light, &c.—which you feel that on no account must be omitted. The second step, then, is to determine what really *essential* to carrying out the idea, expressing the sentiment of the scene. What now remains is either immaterial or detrimental. Obviously, the last must be omitted if possible, or, at least, subdued, or in some way rendered as little obtrusive as possible.

C. Now we have arrived at our subject—that is, we know what we want to say; what must be included; what we should like excluded; and a remaining part that may or may not be made use of as the nature of the case must determine. It now remains to compose, *i.e.*, arrange the parts of the subject in hand. Obviously, as the particular circumstances of each individual case will vary very considerably, only general suggestions can be given, and these will be found to be applicable in very varying degrees. While it is convenient to speak of laws of composition, it is always to be remembered that the word law is used as roughly equivalent to "a general guiding principle observable in the majority of the works of the most successful art workers," and not a rule which must in any and every case be rigidly observed.

(1.) Law of Principality.—This properly stands first, for unless this law be observed the resulting work is nearly always of a feeble character, and is like a story without any moral, point, or pith. As a general rule it will be found that that particular feature, be it a bend in the river, a bit of rock foreground, &c., which first attracted attention, should be reckoned the leading feature, the principal element in the subject. Anything which tends to lead the eye away from this pictorial centre (which seldom or ever should be in the exact middle of the picture) should be subdued or repressed. Any "opposition chief" will, of course, tend to draw off attention, and must be made subordinate, either by moving the camera nearer or further away to one side or nearer the ground. Suppose, for instance, the principal object be a large rock in a river bed, and there is a rival rock drawing off too much attention. Number two cannot be moved, and, therefore, must be endured. This, perhaps, may be done by so altering your position so that the objectionable feature is partly hidden by a brush, or thrown into a mass of shade, &c., by moving the point of sight. Let it be observed that the photographer has much more power over the composition of his foreground than is generally supposed. Comparatively few workers ever think of employing a point of sight about 2 or 3 feet from the ground, and yet in many cases the

advantages of this position are immense. This law applies with much force to the larger divisions of the picture. For instance, if you are attempting a subject in which the sky and cloud are the chief feature, then all else must be made as simple and unobtrusive as possible. Again, if your chief interest is in, say, the middle distance, then the extreme distance and the foreground should both be kept simple, quiet, and undemonstrative.

This law applies to the more important lines of a picture. If there are two or more prominent and equally important lines they tend to struggle with each other for the attention. It applies also to the important masses of light and shade. As a rule, more than one strong high light tends to weakness and confusion. In this matter the work of Rembrandt and Turner offer numerous examples. If figures are introduced, and there are several groups, one group should be made more important than the others. And again, in a single group there should be some one figure (not central) that takes a lead, while the other figures are subordinated to and connected with their "chief" in some way.

(2.) Law of Subordination.—This principle flows as a corollary from the last. By the former we are taught to make some one chief part, line, light, mass, &c., some leading feature. Subordination teaches us to arrange the remaining parts in what may roughly be described as a descending order of importance; so that no two parts contend for, or equally divide, the attention, but, on the contrary, each part or element hands on the attention, step by step, to the central feature of interest. This principle is one of considerable importance in the grouping of figures. Its far-reaching importance may be seen in many of the figure pictures of Titian, Palma, Leonardo, Veronese and others. It may be seen applied to lines and forms in the work of Burne-Jones, Sir F. Leighton, Alma Tadema, &c.

(3.) Law of Unity.—In some senses this law or guiding principle should stand first, seeing that without this quality the work is not one complete whole, but several parts or portions not united. The object of a work of art is for the most part that of conveying a more or less definite impression as a whole. Hence, if any feature is present which tends to cut up or subdivide this impression, the result is felt to be incomplete and unsatisfactory.

As one instrument or voice out of tune with the other parts of a musical performance will mar the whole, so will one part of a picture out of harmony, *i.e.*, unity, with the remaining parts, in like manner tend to greatly injure the completeness of impression. This law is not so likely to be ignored by faults of omission as by those of introduction.

As a simple example take that of the sky and a landscape subject. We may rest assured that, however dull and uninteresting the sky and cloud may be at any given moment, yet it will never be out of harmony with the disposal of light and shade of the landscape. This much can hardly be said for some pictures with skies "printed in" from separate negatives. It is not always possible to secure the sky and cloud on the same negative as the ground—but whenever it be possible it is desirable to do it. And this for at least two reasons: *firstly*, a correct, *i.e.*, true sky, even if somewhat uninteresting (*i.e.*, devoid of strongly-marked features), is better than the most showy "printed in" sky, if the latter has a taint, a mere suspicion even, of untruth; *secondly*, in those cases where, for some reason or other, the sky on the

negative is undesirable or unprintable. Yet it will he in itself valuable as suggesting the most appropriate sky that may he printed in from some other negative.

Where the beginner is most liable to err is where he attempts the introduction of figures, animals, costumes, accessories, &c., without having very carefully and calmly considered if these introductions really assist the work in hand, are needful, are appropriate to their surroundings, suitably dressed, naturally occupied, &c., &c.

Anything which suggests the notion of unfitness is a sure sign of offence against the law of harmony. For instance, the introduction of a person in a "tall," "chimney-pot," "stovepipe," "plug" hat, as the accompaniment to, say, a lifeboat, would strike most people as somewhat out of harmony.

There is another important element contributing greatly to the general unity of a picture, viz., hreadth. By breadth is meant the grouping together those parts which are related to each by the quantity of light (or absence of it, *i.e.*, darkness). Now, as the outdoor worker cannot do much in the way of uprooting trees and overthrowing mountains, he must perforce wait until the sun works round to such a position that the light and dark parts are grouped together. Hence the importance (to the outdoor worker) of seeing his proposed subject under various conditions of lighting—morning, noon, evening. A certain scene may be strictly commonplace when seen in the morning, and yet takes on an enchanted form when the evening sun is low. The poets have all heen ready to seize upon dawn, sunset, moonrise, &c., as times when fancy gets most ground for play. Without pictorial illustrations it is difficult to give practical help, beyond that of a most general, and for the most part suggestive, kind. This much, however, may be horne in mind, viz., that the shadows and shaded parts are often the most effective part of a picture. Hence it is, as a rule, better to have a preponderance of shadow (not too deep) than of bright high light. Also, when the shadows tend to run towards, rather than from, the spectator, the effect of relief is generally better sustained, and hence, when the sun is somewhat towards the front, rather than towards the back, of the spectator, this effect is obtained.

Let it be observed, however, that there are cases where a slight alteration of the point of sight will assist in bringing about breadth. Obviously, any change which helps to unite one shadow with another will tend in this direction. The fact that many photographs on which trees figure largely are generally felt to fail pictorially is often due to "spotty-ness," *i.e.*, many small patches of light finding their way through the darkness of the foliage.

Breadth obviously leads to simplicity of arrangement of light and shade. In simplicity, as in unity, there is often the greatest interest and strength. With many beginners the desire to render every plane of the picture, as well as every detail in the foreground, in the finest and sharpest degree of detail, is a desire which is apt to run away with him. And while detail and breadth are by no means contradictory terms, nor do they stand for qualities incompatible, yet, if the desire for detail be not kept under complete control, the possibility of obtaining breadth and unity is very greatly increased. In the majority of cases, where pictorial effect is desired, it is better to devote attention first to obtaining breadth, and then to the expression of such degree of details as will tend to emphasise and support the principal feature or theme, and at that point to be content, remembering that further degree of detail is dividing, and therefore weakening, the interest as a whole.

(4.) Law of Contrast.—This term is usually limited to the contrasting of light and shade, *i.e.*, bringing into close or immediate contact on the plane of the picture such parts as are in strong light with others in strong shade. By this plan the light is made to appear lighter and the dark darker. (This may very easily be put to experimental test by employing bits of white, grey and black paper.)

Those pictures which are usually associated with the method of work in which the great Rembrandt excelled are often made to rely upon the device of bringing the highest light in close contact with the deepest shade. As, for instance, when the snowy locks of some octogenarian are crowned by a black velvet cap.

As the outdoor worker is for the most part employed upon things which cannot be moved about at his will, he (the worker) must rely for whatever effects he aims to obtain upon the point of view chosen and the time of day, *i.e.*, state and direction of lighting.

Many fine photographic effects have been obtained by employing simple subjects and relying upon contrast for expression of effect. The operator may often find some old tree trunk, sail, mast, ruined tower, rock, &c., which, by a suitable position of the camera, he can bring up against some gleam of light struggling out between a cloud rift.

Attention is urged to this method of working, because by its means breadth and simplicity of arrangement may often be obtained.

The student will do well to remember that the simple expedient of lowering the camera to the height of the eye of a person when seated will often have the effect of compressing an uninteresting foreground, and bringing up stunted forms in the immediate foreground, so that they stand out in the relief of contrast, either against the grey distance, or still lighter horizon sky. The beginner is apt to forget the fact that the majority of outdoor painters work seated, and that often upon a *low* camp stool.

The principle of contrast is, however, by no means to be limited to the juxtaposition of light and dark part. It applies (*mutatis mutandis*, of course) to *lines*, *i.e.*, *versus* curved; straight forms, *i.e.*, those bounded by straight lines, &c., *versus* curved surfaces; degrees of definition; interest, &c. With regard to the contrasting of lines the student will no doubt have noticed the difficulty in determining the degrees of inflection in delicate curves, but so soon as a straight line is brought close to such a curved line the subtlety of its curvature is at once appreciated. This is often to be observed amid the cordage rigging of water craft, where the catenary curves are in contrast with the (nearly) straight lines of the masts. It will also have been observed that in many scenes where there are no well marked straight lines a certain measure of weakness is felt. Whereas, if one or two straight lines (distant water, horizon lines, &c.) be introduced with care, a feeling of firmness and strength is imparted. This applies to form also. As, for instance, among a mass of rounded, water-worn rocks there be one or two bits showing recent angular fracture; this element not only adds to the interest by variety, but also adds value to the curved forms by contrast. In short, it may be said that on the one hand we may have contrast, variety, interest, emphasis; on the other, repetition, monotony, weakness.

(5.) Law of Balance.—This may be almost said to follow from the last considered principle. Contrast is the juxtaposition of opposites, so that

each emphasises the other. Balance is the opposing of opposites—not necessarily in juxtaposition—chiefly with a view to prevent monotony. Thus, several important lines, pointing towards one and the same direction, induce monotony and fatigue. Whereas, if one or two be introduced in a somewhat contrary direction, variety giving the sense of compactness and stability with interest then follow. Similarly, if all the light part of a picture be on one side and all the dark on the opposite, the result is felt to be one-sided and incomplete, but if some shade be carried into the light part and some of the light replace the shade, variety, and with it additional interest, follows. Obviously, if this process be carried to excess, the evil of spottiness, patchyness, and confusion, must arise. Hence, here as in all other laws or principles, it behoves the student to avoid excess of any kind.

As soon as any one of these devices becomes manifest it has most probably been used to excess, and to the detriment of its counterbalancing principle. Thus it will be seen that great care and a nice judgment are required so that the artist may use this or that device in such a natural, unsuspected, and consistent manner that the spectator is agreeably impressed without being distinctly conscious of any special or emphasised cause for the impression.

The student will observe how easy it is, when avoiding one undesirable effect, to pass into some opposite extreme. Thus, when avoiding the extreme monotony of breadth, when carried to excess one may easily pass to the opposite evil of spottiness. Similarly if the worker is, for the moment, carried away by the idea of obtaining efficient balance, he may overlook the fact that this tends to destroy or counteract the law of principality. For instance, suppose his subject be a rustic bridge, and he waits until a boat comes nearer and nearer to give balance of interest, when presently his boat becomes all important, and his bridge sinks into insignificance—hence the soundness of the advice, "the simpler the better." In the majority of photographs, the chief and first felt defect is one of *too much subject*. The many little unnecessary details are so many channels whereby the attention is being drawn off from the chief and principal subject.

To sum up the matter briefly, so that the outdoor worker may have something to think over as he wanders about in search of the picturesque (and of fame), let him remember—

(*a*) To be sure that the thing to be done is worth doing, and doing with the best ability he can bring to bear upon it—quality, rather than quantity, being his aim. (May the plate makers forgive me this unsympathetic advice !)

(*b*) To see the subject under as many different aspects, points of view, lighting, atmospheric conditions, etc., as possible, so that the best, most telling effect, and time be chosen.

(*c*) To have some chief important feature, theme, idea, story, moral point, let it say some one thing definitely, distinctly, and unmistakably.

(*d*) To let all else fall into the second, third, fourth . . rank, and yet that all other parts, as far as may be, tend towards and help the story, support the theme, and not contradict what you have to say.

(*e*) To take care that nothing, or as little as possible, is present which can suggest unfitness, unappropriateness. Let all the parts "pull together"—"a gloomy sky and a weary moor."

(*f*) To remember that nothing is more "unforgivable" than insipidity, and that any feature, light, curvature, etc., may be emphasised by judicious introduction of its opposite.

(*g*) To remember that the mind objects to monotony, and finds interest in variety. Hence a pleasure is felt in passing from one object to a *somewhat* similar one; but little or no interest is felt in passing from one thing to another so like it that it is a matter of irritation to know wherein lies the difference.

The following hints of what *not* to do may also be noted:—

(1.) Do not place the most important feature in the middle of the picture.

(2.) Do not have your horizon line half way up the picture.

(3.) Avoid strongly marked straight lines parallel to and near any of the margins of the picture.

(4.) Avoid rows of things placed at equal distances, and especially if they appear at anything like equal distance in the picture plane.

(5.) Do not have all your interest on one side of either median line (vertical or horizontal).

(6.) Avoid, as far as you can, any strongly marked lines which meet at, or near, a right angle. [Exceptions, buildings and sea horizon.]

(7.) Avoid photography with the sun exactly behind your back—as shadow-relief in this position is next to impossible.

(8.) Avoid any strong line or feature (*e.g.*, tree trunk, etc.) which divides the picture either horizontally or vertically into equal or nearly equal parts.

(9.) Be careful lest the background of any figure or animal introduces confusion; *e.g.*, one may see a distant church apparently resting on the back of a cow, or a flower-pot behind a human head appearing as a startling innovation in hats.

(10.) Don't affect to despise all laws and examples which the accumulated experience of ages has confirmed, and then call your action originality. But walk before you run. Give a thing a fair and just trial before you reject it as worthless. Whatever you set about doing, aim to do it to the very utmost of your ability, and don't be above acknowledging a failure, nor neglect to learn the lesson that every failure teaches.

Earnestness of purpose and simplicity of action are the best aids for an honest man—be he prince or peasant, artist or artisan.

The Theory of Development.

By H. Leach.

IT is now generally admitted that to produce the best results in photography at least a fair knowledge of chemistry is essential, and as development is at once the most interesting and the most difficult of the processes involved in the production of a photograph, the theory of it should be thoroughly understood.

The principal constituent of an unexposed dry plate is silver bromide, AgBr, which, it will be seen, is a simple compound of silver with the halogen bromine. Numerous conjectures have been formed as to the probable action of light on this salt in the production of the latent image; but it appears most likely that a very small proportion of the bromide is converted into sub-bromide, with an evolution of bromine, thus—

$$\underset{\text{Silver bromide}}{2\,AgBr} = \underset{\text{Silver sub-bromide}}{Ag_2Br} + \underset{\text{Bromine}}{Br.}$$

so that the latent image is composed of sub-bromide of silver, and it is on this that the developer first commences action.

Now alkaline pyrogallic acid ($C_6H_6O_3$) is a very powerful deoxidiser and reducing agent, and possesses a great affinity for the halogens, which properties can be easily demonstrated by the following simple experiment:—Precipitate a small quantity of silver bromide in a test tube by means of solutions of silver nitrate and potassium bromide. Wash the precipitate, and on it pour a solution of pyrogallic acid, when it will be found that a discolouration of the surface of the bromide takes place, though very slowly. Now add a few drops of ammonia, when the reducing action will be considerably accelerated, the bromide blackening very quickly, and the pyro becoming oxidised and discoloured at the same time. It will also be found that an addition of a small quantity of potassium bromide to the pyro-ammonia solution will considerably retard the reducing action.

On commencing development we have, as already stated, a latent image of sub-bromide of silver in conjunction with an excess of the simple bromide, and it will be readily understood that of these two the sub-bromide will be the first to be reduced to the metallic state, on account of its requiring less work to effect the change. This takes place in the following manner :—

$$\underset{\text{Pyrogallic acid}}{C_6H_6O_3} + \underset{\text{Ammonia}}{2NH_3} + \underset{\text{Water}}{H_2O} + \underset{\text{Silver sub-bromide}}{2Ag_2Br} = \underset{\text{Oxidised pyrogallic acid}}{C_6H_6O_3O} + \underset{\text{Ammonium bromide}}{2NH_4Br} + \underset{\text{Silver.}}{2Ag_2}$$

During this reaction we observe that the latent sub-bromide image is reduced to metallic silver; but as the amount of sub-bromide was infinitesimally small, the silver image at this stage would be so thin as to be quite invisible, and it requires to be explained how density is so gradually attained. The most natural assumption would be that the bromide would be next attacked

and reduced, but a moment's reflection will make it clear that this cannot be, for since the bromide is spread practically equally all over the plate, an even reduction of silver would, in this case, be the result, whereas the image is formed by the varying thicknesses of the silver deposit. The explanation lies in the fact that the freshly reduced particles of silver and the adjacent silver bromide react, and fresh sub-bromide is formed thus:—

$$Ag_2 + 2AgBr = 2Ag_2Br.$$
$$\text{Silver} + \overset{\text{Silver}}{\text{bromide}} = \overset{\text{Silver sub-}}{\text{bromide.}}$$

The silver sub-bromide produced in this manner is again reduced by the developer as in the previous equation; more sub-bromide is then again formed, which is in its turn reduced; and these two reactions continue to take place alternately in this manner until full density is arrived at.

Ammonia acts as an accelerator of development, firstly, by increasing the oxygen-absorbing properties of pyrogallic acid; and secondly, by reducing a small portion of the silver bromide to a state of semi-solution, which renders it more eager to enter into subsequent reactions.

The restraining properties of the soluble bromides are due to the fact that by their aid double bromides are formed with the silver. More work is evidently required to reduce the double bromide to the metallic state than would be necessary for the reduction of the simple bromide; but its action as as a restrainer will probably be most pronounced in the reaction where the freshly reduced silver combines to form sub-bromide, since it will be first necessary for the silver to reduce the double to the simple bromide before it can again reduce the latter to silver sub-bromide. It also possesses another restraining action, in that it diminishes the amount of silver bromide, capable of entering into the state of semi-solution in ammonia, as explained above.

In developing formulæ is also generally included something to preserve the pyro while in solution. This is usually either an acid, to acidify the pyro, which in that state does not absorb oxygen; or something with a stronger affinity for oxygen than the pyro itself. Sodium sulphite, Na_2SO_3, which is most commonly in use, belongs to the latter class, and as it absorbs oxygen from the air, it becomes converted to Na_2SO_4, or sodium sulphate.

Eikonogen and hydroquinone developers, being both alkaline, behave in an almost precisely similar manner to pyro; but with ferrous oxalate, which is acid, the commencing of the developing action is as follows:—

$$3FeC_2O_4 + 2Ag_2Br = Fe_2(C_2O_4)_3 + FeBr_2 + 2Ag_2.$$
Ferrous oxalate + Silver sub-bromide = Ferric oxalate + Ferrous bromide + Silver.

The deposited silver in the above equation then combines with the unaltered bromide in the film to form fresh sub-bromide, as in alkaline development, and so the action continues. Ferric oxalate, produced during development, as shown in the equation, is a powerful restrainer, and also possesses a strong tendency to destroy the latent image; and the ferrous bromide, also produced, has a strong retarding action. Sodium hyposulphite is, therefore, often used as an accelerator, as it reduces the ferric oxalate to the ferrous salt, which is the developing agent, and it also decomposes the ferrous bromide. Potassium bromide is usually added to the developer as a restrainer, and performs in the same way (by forming double bromides), as in alkaline development.

THE PRINCIPLES OF LANTERN PROJECTION.

By Clement J. Leaper.

THE optical lantern occupies nowadays such an important position, both as a means of producing enlargements and as an educational adjunct, that a short discussion of the principle involved in its employment may prove interesting to users of it.

The essentials of a projecting apparatus are—

1.—A source of light.
2.—A condenser.
3.—A projecting lens.
4.—A screen.

(1.) Source of Light.—This may be oil burnt in a special form of lamp, the so-called lime light, or the electric light. The luminosity of each of these sources varies considerably. Taking as standard a double-wick lantern burner such as is commonly used in the cheaper lanterns, and calling its luminosity unity, we may roughly tabulate the luminosities of the other sources, thus:—

Double-wick oil burner	1
Three ,, ,, ...	from $1\frac{1}{2}$ to $2\frac{1}{2}$
Four ,, ,, ...	,, 3 to 4
Blow-through jet	,, 5 to 8
Mized gas jet ,, ...	,, 10 to 20
Electric light, incandescent or arc ..	,, 5 to 40

Each of these sources of light possesses certain advantages and disadvantages. Oil lamps are messy, troublesome to keep in order, give off an unpleasant smell, and radiate a large amount of heat, but, on the other hand, cost little for material. They are, however, quite unsuitable for projecting images more than four feet across, owing to the relatively feeble illumination they give.

The blow-through and mixed gas jets are both cleanly in working, but expensive and not absolutely free from danger.

The electric light carries the palm, but its cost is prohibitive if batteries have to be employed.

In large towns, where electric light installations have been put up, its cost would, however, in many cases, be probably less than the lime-light.

Oil Lamps.—The fuel employed is ordinary petroleum, burnt in a special form of lamp. The luminosity of an oil lamp depends upon the degree of perfection with which the wicks are trimmed, and upon the efficient ventilation of the flames. The wicks must be trimmed perfectly straight to begin with, the extreme corners being finally clipped off. A special form of scissors is sold for effecting this, with the minimum of trouble. The wicks should be trimmed each time the lamp is about to be used, as it is impossible to get the flame to burn with full brilliancy with a charred wick. The ventilation of

the flame is effected by admitting air to it from the bottom or sides. Evidently, if the channels through which the air is admitted are choked up, the flame cannot burn properly. It is essential on this account to carefully clean the air holes just before the lamp is used, so as to free them from dust, charred wick, etc. Occasionally the entire burner should be removed, boiled for fifteen minutes in a pint of water, in which a packet of Hudson's extract of soap has been dissolved, and then carefully dried by being placed in the oven. This renovates a burner wonderfully, and the same treatment is, by the way, very effective for household burners. Obviously, the glass chimney should be kept quite clean. Soft tissue paper is the best material to employ for this purpose.

As regards fuel only the very best kind of petroleum should be employed, and it is well to dissolve in it a small quantity of camphor, say, half an ounce to the gallon. The lamp cistern should be filled quite full, and the outside of the lamp carefully wiped free from any oil which may have been spilt. Brown paper is the best material to absorb the oil, and attention to this particular will tend to greatly diminish the unpleasant smell. The filled oil cistern should be placed, if possible, in a warm place for half-an-hour or so before commencing. This saves subsequent trouble in regulating the flame as the lamp heats up. The best results are obtained when the flame is on the point of smoking, so having lit the lamp it should be turned up until it smokes, and then turned down until it just ceases to do so. The lamp, smokeless at first, will probably begin to smoke as it gets heated during use. The operator must be on the look out for this and at once lower the flame, as the gases from a smoking lamp are neither pleasant or wholesome.

Oxyhydrogen Lamps.—These are sub-divided into blow-through and mixed gas, both depending for their operation upon the fact that a coal gas flame through which oxygen is passed when urged against a cylinder of lime will cause the latter to glow brilliantly. In the blow-through jet, the oxygen is merely blown through the burning coal gas; in the mixed gas jet, the gases are first mixed and then burnt together. The coal gas necessary for the flame is got from the usual gas pipes; the oxygen has to be made and stored in a gas bag, or may be purchased compressed in steel cylinders ready for use. To use the jet, one end of a piece of rubber tubing is slipped over the nearest gas jet, care having been taken to remove the gas burner so as not to diminish the pressure, the other end of the rubber tubing being slipped over the lantern tube marked H. Both stopcocks are then turned full on, and the coal gas is lighted. The oxygen is next turned on until the flame roars, and then turned off until it ceases to do so. If the oxygen is used from a bag, the tap at the bag is first turned on fully and the supply regulated from the lantern tap, the gas bag having been suitably weighted to get the requisite pressure. If cylinders are employed a regulator may or may not be used. If it is decided to employ one, this is screwed on to the cylinder and the tap of the latter then gradually opened, the exit tube of the regulator being connected to the lantern tube. The supply of oxygen can then be adjusted from the lantern tap in the usual way. If a regulator is not used, the lantern tap is turned on fully, and the tube connected direct to the cylinder, the supply of oxygen being regulated by very gradually opening the latter. The latter plan is the one the writer personally prefers, and after a few trials will be found quite easy to carry out. The use of a regulator is

certainly more convenient, but there is its cost to be considered, and the danger of its bursting—one or two serious accidents having recently occurred through its use.

Electric Lamps.—These may be either incandescent or arc lamps, the former being used for projecting relatively small images, the latter for larger ones. In incandescent lamps the electric current heats up a carbon filament inclosed in a vacuous globe, the filament glowing without at the same time burning away. In arc lamps the current passes between two carbon pencils, the light being in this case mainly due to the heating of the carbon vapour existing in the intervening space. Since carbon burns away in air an arrangement must be provided for maintaining the distance between the carbon pencils constant, as if it becomes too great the arc ceases to pass, and if too small the maximum effect is not obtained. This arrangement is generally automatic and worked by the same current which supplies the lamp.

(2.) The Condenser.—This consists of a pair of lenses, the object of which is to cause the rays of light diverging from the source of light, to converge towards the image to be projected. Obviously the diameter of the condenser should not be less than the diagonal of the slide or negative to be used.

Opinion varies somewhat as to the best form of condenser ; that usually adopted consisting of two plano-convex lenses with their curved sides facing each other.

The image of the circle of light formed by the condenser should be projected on the screen as a circle of light, with perfectly sharp edges, and without any dark patches. To effect this the light must be centred, and upon the way in which this operation is conducted the beauty and sharpness of the image greatly depends.

With an oil lamp, the flames, to begin with, must be turned up until they smoke, and then turned down until they just cease to do so. The lamp itself must then be moved backwards and forwards until a circle of light with sharp edges is seen on the screen. A slide is next inserted in the lantern and focussed, and the operation of centring repeated as accurately as possible. With an oil lamp it will be observed that the maker permanently adjusts the height of the flames and their position right and left, the correct distance from the condenser having to be found by the user. This distance will depend, be it remembered, upon the distance of the screen from the lantern, or in other words, upon the size of the image it is desired to project. With the oxyhydrogen or electric light the source of light must be moved up and down and right and left, until a circle of light, free from dark spaces, is got, and after this the distance of the source of light from the condenser must be altered until the edges of the circle are perfectly defined.

Condensers being made of glass of considerable thickness are liable to fracture. To avoid this mishap it is well to light the lamp in the lantern some time before centring, placing it as far as possible from the condensers. By this means the condensers are gradually heated, and the risk of fracturing them is reduced to a minimum. For the same reason it is well to avoid opening the lantern doors when the lantern is working, unless it is absolutely necessary to do so.

(3.) The Projecting Lenses.—These usually consist of an ordinary portrait combination, with the lenses reversed, but if expense is no object a special lens, such as that made by Dallmeyer for this purpose, will give better results. In a projecting lens we want a flat field, *i.e.*, an image sharp all over, but this must not necessitate stopping down and its consequent loss of light. The actual dimensions of the lens will depend upon the size of the image to be projected, a ¼ plate negative or a lantern slide requiring a ¼ plate lens, a cabinet, a cabinet lens, and so on. The size of the image on the screen has nothing to do with the size of the lens used, *i.e.*, a ¼ plate lens will give a 10, 20 and 30 feet disc, and so will a cabinet lens, only in the latter case the lantern will have to be farther away from the screen. The lenses and the condensers must be scrupulously clean, the slightest dust or dirt resulting in loss of definition. Soft tissue paper is the very best material for cleaning them.

The focal length of the projecting lens regulates the size of the image formed at a given distance from the screen, the shorter the focal length the larger the image at a given distance. Lenses for projecting are generally made of as short a focal length as possible, to avoid loss of light.

(4.) The Screen.—The material commonly employed is calico, which can be procured in suitable widths. If it is necessary to join it, care should be taken that the seams run vertically not horizontally. To obtain the best possible result, the screen must be as opaque as possible, and must lie as flat as possible. To render the screen opaque some operators whitewash it, and to cause it to lie flat it may be hung, if of moderate size, inside a wooden frame, the edges of the screen being eyeletted, and stout twine employed to lace it tight.

Obviously the screen must be parallel to the slide or negative. If the lantern, as is generally necessary with large screens, has to be tilted upwards, the top of the screen must be pushed outwards. A neglect of this precaution means loss of definition and distortion of the shape of the mask through which slides are usually shown.

In projecting lantern slides to be viewed by an audience situated at different distances from the screen, it is well to remember that an image of a given size can be seen to perfection from one distance only. The correct point of view can be easily found by trial, and it is there, of course, that the best seats should be placed. It frequently happens at lantern exhibitions that the audience occupying the front reserved seats are in a far worse position for viewing the image than those further off. This arrangement reflects little credit on those who have charge of the show.

Sometimes it is convenient to project the image upon a screen between the lantern and the audience. In this case there is evidently a very great loss of light and it is consequently suitable only when the image is of small size.

To render an ordinary calico screen temporarily translucent, it suffices to to syringe it with weak starch water. If the screen is to be made permanently translucent and is a fixture, it may be thinly coated with copal varnish, but if the screen is only for temporary use and has to be put away this will not answer. In such a case a good result is obtained by coating the calico with a mixture containing, white wax 200 parts, spermaceti 50 parts, spirits of turpentine 500 parts, a hot iron being passed over the screen when

the turpentine has evaporated, so as to cause the wax and spermaceti to sink into the material. For projections up to a yard in diameter a ground glass screen answers admirably, but care must be taken that the grain is not too fine, otherwise the lantern will be seen through the screen. For the same reason in using the varnishes given above, care must be taken not to apply too great a quantity of them to the surface of the calico.

Kit and Comfort.

By Olaf Merreleigh.

PHOTOGRAPHY has taken hold of all classes of the community, and because of the fact that there are more persons of small means than otherwise, it has, of course, made more votaries from the unfunded classes. These devotees have to consider economy of necessity—and certainly should do so on principle. To practice the art it is not necessary to be rich, but it is desirable to consider one's ways and be wise. At the start, after the enthusiasm has been aroused to the commencing pitch, it is better to consult some friend who has passed through the portals into the avenue that is continually widening and improving as experience is achieved. If he has been a person whose means have been somewhat circumscribed, he will have learnt carefulness and economy—of time, material, and money. He will have succeeded in spite of these (to some) drawbacks, and be the better for it. To such a person the beginner should turn for advice as to kit and comfort, for both of these are matters of value and consideration. As to kit the majority of workers will have to be content with a small camera and its accompaniments, and it may be best to advise that a start should be made with a quarter plate, or a 5in. x 4in. outfit. All dishes, and the rest of it, will be moderate in size and corresponding as to cost. There is the consideration as to weight—also no small factor—for many persons will have to get their photographic pictures by footing it, mile on mile, as they get opportunity. Amateur photographers are not yet powerful enough in influence, individually or collectively, to induce railway managers to reduce the fares. So pedestrianism will probably be developed at the same time that photography is being gained experience of. It is desirable, therefore, that kit should bring comfort, as far as it can be made to do by lessening the weight of gear necessary to be carried. This should be brought to a minimum, and to do this is by no means so difficult as it may appear to be. Many persons do no appear to think out the subject, as they may do if they seriously set about it. For no very superior intelligence is necessary to bring about the wished for end.

Take the camera first. This may be lightened by the substitution of a celluloid screen instead of ground glass, and such a screen is quite as effective for its purpose as the glass, and in case of accident the film will stand more knocking about than glass. The writer has used a thick Fitch film with ground glass effect on one side for the past two seasons, and without the slightest loss of sharpness in his pictures. He had previously broken more

than one ground glass. The change was the result of lessons learnt in the school of experience. A single lens would probably be, if used carefully and with brains, good enough for such work as the learner should take in hand for a single season, at any rate. A very large number of workers appear to think it necessary to provide a number of dark slides—one for every two pictures to be had on the trip. As dark slides are by no means cheap portions of the kit it does seem absurd to go to the extravagance of procuring from three to six, such as some persons do (and when they have used up the plates of these, no matter what remains to be done, they must stop), when one double slide or even a single one would be all that is needful. One double dark slide, or a single one, is lighter to carry than a set of them, and though the discomfort arising from the carrying of the lot may not be much, yet, such as it is, it might be reduced. The writer has not found it necessary to use more than one slide for the past two seasons, and several of his friends have seen fit to flatter him by the copying of his method, even though they were much older photographers than he is. He has a bag made of satteen, black outside and ruby within, big enough to take a box just large enough to take a quarter-plate, and roomy enough (the bag) to place one arm and hand within to load and discharge the dark slide. The bag aperture is closed by a band of elastic, and this can be fixed in any way that may suit individual fancy. The hand that is outside is more valuable than if both were contained in the bag during the operation of changing. The box itself opens with a cover at what may be called the end of the plate, and this cover is deep, so that light is completely excluded. Changing is rapidly done, and thus far the method has not resulted in a single fogged plate. The box holds about a dozen and a half plates, but will hold about eighty films. This brings into view another factor in the comfort the writer is endeavouring to cultivate. A dozen plates will probably weigh nearly, if not more than, as many ounces. A dozen films (the writer has no experience of any other than those of Fitch) weigh about an ounce, and though films are dearer (those of all makes) than glass, he is convinced that in the end economy is secured, and comfort is attained. More care is exhibited in the exposure of films because of the cost, and there is some hesitancy in picture-making, with the result that better pictures are had. The box and bag referred to will go into an ordinary coat tail pocket, the dark slide and register into another, and there only remain the camera and legs to be dealt with. These, on tramp, can be tucked under the arm, or the legs folded up, and a strap put around the lot, and the whole carried by means of a broad strap over the shoulder. By this means twenty-five miles a day has been done, and a couple of dozen pictures taken, besides having time for halts for refreshment; and the weight of the kit, and its disposal, has been on the side of comfort.

After, when the indoor work comes on, the development of films is, in the writer's estimation, much more comfortable, in every way, than that of glass; and the inducement would have to be very great to cause him to vary his procedure. He is a believer in comfort—and good photography, which is above the consideration of mere comfort—which is the reason these suggestive lines are written as a hint to other workers.

Isochromatic Values of Commercial Dry Plates.

By Frederick Parsons, F.S.Sc.

So much has been written upon orthochromatic photography by eminent writers and professors of the art-science during recent years that the reader might fairly inquire—What new aspect of the subject can call for ventilation and publicity in Photography Annual? To such a query it may be well to make a brief rejoiner, and, at the same time, to pen a few introductory lines concerning the simple aims of my paper.

Some three years ago, when the commercial isochromatic plates were, comparatively, but little known, the old premises of the Camera Club, and, subsequently, the pages of *Photography*, were the venue of some wordy warfare concerning the advantages of "isochromatic" over the "ordinary" commercial dry plates. It would serve no useful purpose here to revert to the personalities of the doughty champions of the two varieties. The encounter, so far as printer's ink and paper went, was a most interesting one, and closing, happily, on the part of the combatants with notes of mutual satisfaction and admiration—would this were alway characteristic of photographic disputations—gave promise to the interested onlookers of a sequel of still greater interest and usefulness.

Since no news has ever reached the outer photographic world of the camera-combat alluded to having actually taken place, it is presumed that, like many other self-imposed tasks, the project remains in abeyance. Be that as it may, however, no small advance into popular favour has, meanwhile, been made by those isochromatic qualities, the advantages of which were then so strongly maintained on the one hand and charily granted or denied on the other.

One of the most interesting commercial features of the coming photographic season will, I believe, be furnished in a tremendous run upon isochromatic—the more "colour-correct"—dry plates and films. The commendable enterprise displayed by the Ilford Company in their new plate venture, and the consequent reduction in the price of all isochromatic goods upon the market to the extent of some 25 per cent., are signs unmistakable enough, even in the short, dark days this is written in. Having regard, therefore, for the interest which centred around the before-mentioned controversy, the present appears a very suitable period for penning a few definite notes—supplemented by the convicting evidence of ocular demonstration—upon the values in practical photography of the qualities in question.

The lines upon which these simple experiments have been made leave plenty of scope for further individual amplification; or, as some may prefer, the direct landscape test-exposures, such as were contemplated by the two early champions. My own photographic efforts of recent years have been to

a considerable extent connected with the literature of applied art, and the advantages derived from using isochromatic plates, when objects of decorative form and colour were rendered from polychromy into monochrome, for subsequent reproduction as illustrations, have always been self-evident. In such instances, and dealing with colour values distinct and definite, the shortcomings of even the so-termed "colour correct" dry plate could not fail to be fully and accurately gauged and noted—so far as normal vision and a trained and experienced faculty for colour can be considered as accurate powers of discrimination. Having myself, from such studies, derived so useful a knowledge of the colour values as rendered, no better means can be adopted, I believe, by which to bring home to the photographer of average attainments a like appreciation and understanding.

In writing on colour—I use the term here in its everyday sense—several drawbacks in the way of unanimity between writer and reader are liable to crop up. Unless the scientific language and resources of "prism," "spectroscope" and "diffraction grating" form the basis of exposition and argument, it is impossible to arrive at conclusions which, from a purely scientific standard, shall be incontrovertible. Such a demonstration I have here no ambition to attempt. Bearing in mind, however, how very naturally one is prejudiced against the comparative results of orthochromatic negatives displayed at exhibitions, and from the fact of such examples being invariably the work of persons commercially connected with the plates, I have made special efforts to free these results from any suspicion of bias in working.

The diagrams reproduced on the adjoining pages are the results of copying a printed set of colour examples contained in "Colour."* It would have been no very difficult task to have made a more elaborate arrangement of coloured surfaces, or even to have reproduced a painted representation of the colours of the normal spectrum. The advantage of the plan adopted, however, is this, that any reader so desirous can possess himself of a fac-simile of the colours copied; whilst at the same time my results cannot be questioned, by reason of the originals being a purely individual arrangement or one of misleading colour-tones. Had a special chart been prepared for this purpose such would have necessitated a lengthy recapitulation of pigments and processes, colour-hues, tones and luminosities, all of which particulars every reader could have interpreted in a manner entirely acceptable to himself, but perhaps vastly different from the special production so prepared and described.

Before considering the results here shown, it may be well to note the particulars of light and development by which the negatives were prodnced. The copies were made early in December, and upon two bright, sunny days. Besides having a good light, north and north-east, through the window, I obtained a double illumination by reflecting the daylight back again on the samples with an ordinary mirror. All the exposures were made between 11.0 a.m. and 2.0 p.m., at which time the light, for all practical purposes, was of equal intensity. The standard time of exposure, using whole-plate Optimus W.A. lens, F. 16, upon $\frac{1}{4}$-plates, was 30secs., and the relative exposures given were as one to four without and with yellow screen, respectively, for the

* From Professor Church's "Colour," price 3/6, by permission of the Publishers, Messrs Cassell & Co., Ltd.

"ordinary" and "medium isochromatic" plates. The same proportions, with and without screen, but with half the standard exposure, were followed for "extra-rapid ordinary" and "instantaneous isochromatic" brands. These exposures had pre-determined by a few trial plates.

It is a well-worn photographic axiom that when a worker is thoroughly used to and satisfied with one particular developer for gelatine dry plates he should "stick to it." For this reason, and because since its introduction I have used little else for any brand of ordinary or colour-correct plates on the market, these test plates were developed with eikonogen. Every precaution against light fog was taken, and since each exposed plate contained on it the effect of a portion of black or white surface, equality in deposit could be fairly gauged. I may say that the negatives were fully developed out, until the black had slightly veiled over. All were treated to a dip into Edwards's clearing bath after fixation, and in some cases ordinary and isochromatic were developed together in one dish. The constituent parts of this all-round developer I append :—

No. 1.		No. 2.	
Eikonogen	4 drams.	Carb. soda	3 drams.
Acid sodium sulphite ..	1 oz.	Caustic potash	½ dram.
Made up to 20 ozs. with water.		Made up to 20 ozs. with water.	

Equal parts of 1 and 2 for a properly exposed negative.

Since with this formulæ I have invariably obtained all desired density with any brand of plate, and bearing in mind that the diagram results were to be shown for their *relative* values, the above proportions were throughout strictly adhered to. With the copies of the oil colour landscape sketch, the addition of a little bromide of potash was made for the sake of density and brilliancy in reproductions on so small a scale.

It is now advisable to turn our attention to these monochrome copies of coloured surfaces, and to make a cursory analysis of the interesting results obtained. There is a marked difference, at once apparent, between the isochromatic and the ordinary. The former pair give results not only more distinctly affected by diversities of *colour*, but, further—under the same conditions of copying and development—appear to render pre-existing *neutral* tones with more contrast and brilliancy. The discs which are placed in the centre of each square division of colour serve here a very useful purpose, quite foreign to that which they answer to in the original diagram. The white square, No. 6, has been printed to the least perceptible tint of greyness, and as each division is sub-divided by black lines we are able to make some useful comparisons. The six discs are all identical in tone, and are of a dark grey, about half-way between the extremes of black and white. In fig. 1A (isochromatic without screen), the purple-red division photographs lighter than a bright vermilion coloured square. Intense blue (No. 2) is a decided degree lighter than No. 4—chrome-yellow, this latter being the most striking anomaly.

The results shown on fig. 2A are a great advance; blue (2), green (3), yellow (4), and white being converted into monochrome, which very fairly represents the luminosity of the originals. No. 5 is, however, a very dis appointing effect, for the difference in brightness to normal vision between

the deep grey disc and the above square is about equally reversed in the original.

The flat appearance of the prints from ordinary negatives compared with the isochromatic is so distinct that not until several duplicate plates had been tried were the results accepted as representative. It is a self-evident fact, from the foregoing, how very little of truth to nature in *values* there can be contained in the thousand and one medalled landscape photographs that have been taken on the particular brand of ordinary plate here represented. No more striking evidence again can be given that a successful photographic view is infinitely more the result of selected or pre-arranged contrast, composition and effective light and shade, than of the imaginary skill on the part of the photographer in reproducing and controlling "true values" by development.

It is very probable that with special development a little more general vigour might have been obtained with the ordinary plates, but normal development and normal results were best attained by the procedure already described. Before considering the second set of diagrams, there are a few items of scientific interest that call for a brief reiteration at this point.

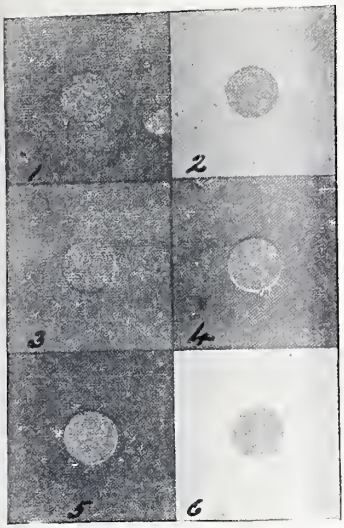
The amount of light which a substance may reflect differs very materially according to the nature of its surface. Lambert, according to Ogden Rood, made careful measurements, and with these results, that whilst silver is capable of reflecting ninety-two per cent. of the light falling upon it, and steel sixty per cent., yet the total amount reflected by white paper is but forty per cent.

Although from the foregoing we get but a general conception of the relative brightness of white surfaces, we are further indebted to Professor Ogden Rood for measurements of luminosity, or brightness, of coloured surfaces, such as those here photographed. In "Modern Chromatics," page 35, he gives as the results of personal experiments these conclusions. Assuming the luminosity of white paper to be 100, that of English vermilion is but 25·7. Pale chrome-yellow, washed on as a water-colour, gives 80·3; pale emerald green 48 6; ultramarine blue has but the low comparative luminosity of 7·6. Although Rood does not give us a purple-red such as here represented by division 6, the luminosity of this would probably be very near to that of ultramarine, whilst it must not be forgotten that even lamp-black reflects about 5 per cent. of white light. These proportions enable us to gather a fair impression of the extent to which even isochromatic plates used with a screen are not orthochromatic, *i.e.*, *truly* colour-correct. When, however, we glance at the way an "ordinary" plate reproduces No. 4, a division reflecting four-fifths of the luminosity of white (No. 6), and again at No. 2, which from the visual aspect of colour should appear almost black, one is inclined to wonder that pure landscape photography has ever attained any art status at all. "That which is beautiful is true!" "That which is true must be beautiful!" If this irrefutable old axiom in art stands good in photography, how much artistic beauty can an ordinary photographic view of a landscape display?

In plate 2 the results are equally definite and interesting. Each reproduction contains the same colours in two divisions. Upon the upper half we have a white field, and upon the lower a black ground. Upon the latter three discs of primary colours are shown, "R" (vermilion), "G"

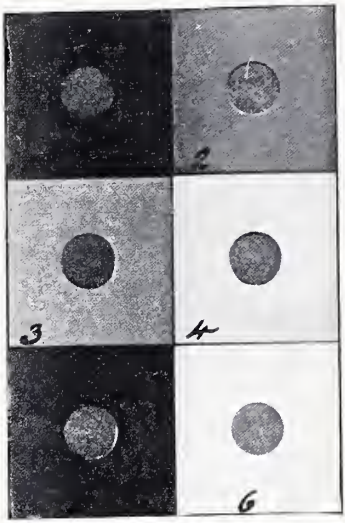
PLATE 1.

FIG. 1a



1a. MEDIUM ISOCHROMATIC without Screen).
2a. Ditto (with Screen).

FIG. 2a.



3a. On ORDINARY PLATE (without Screen).
4a. Ditto (with Screen).

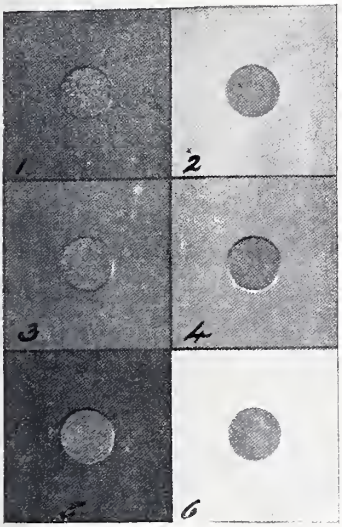


FIG. 3a

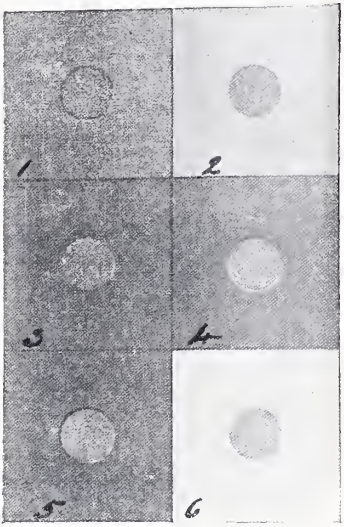


FIG. 4a.

COLOURS REPRESENTED.

1. PURPLE RED (Deep Crimson Lake).
2. ULTRAMARINE BLUE (Artificial).
3. EMERALD GREEN.
4. CHROME YELLOW.
5. VERMILION.
6. WHITE.

PLATE 2.

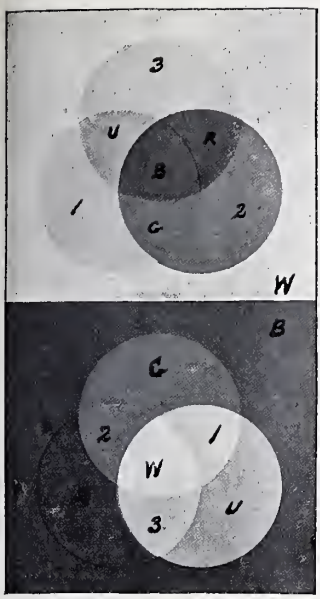


PLATE A.

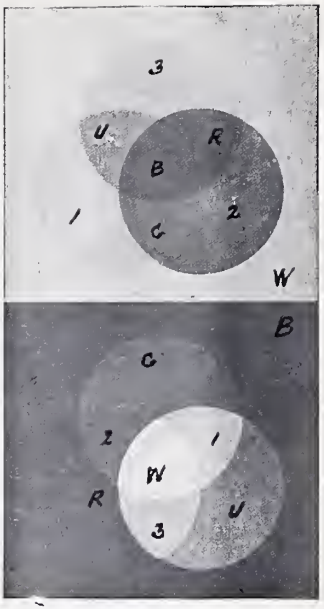


PLATE B.

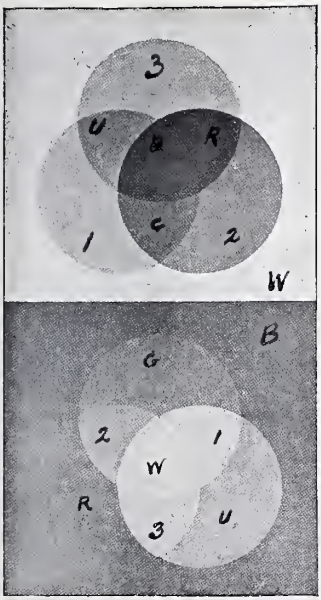


PLATE C.

A. Extra-rapid or Ordinary (without Screen).
B. Ditto, with Screen.

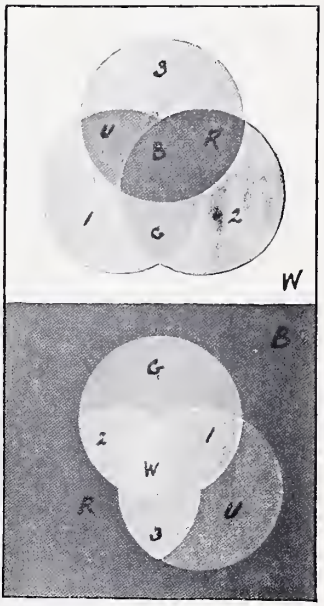


PLATE D.

C. Instantaneous Isochromatic (without Screen).
D. Ditto, with Screen.

PLATE 3.

HOW A COLOUR SKETCH COPIES



(1.) ORDINARY PLATE.—Light yellow greens of foliage rendered as dark tones; white clouds of same value as medium blue sky, also false rendering of values in the colours of water.



(2.) ISOCHROMATIC, WITH SCREEN.—Luminosities of foliage and water much truer, more detail, half-tone and atmosphere displayed, clouds distinct from sky. (The clouds, however, are lost in the reproduction.)

(emerald green), and "U" (ultramarine). Portions of each disc overlap the others, the printed colour division displaying the relative results obtained by mixture of colour and luminosity of the two juxtaposed. Sector 1 represents a light sea green, the effect of mixed blue and green. Division 2 represents chrome-yellow, obtained with red and green; and 3, a light purplish tint, is the presumed resultant mixture of blue and red light. The top division shows the same colours, but reversed in position, black occupying the centre in the one set, which white is given in the other. The interested reader can now ponder these comparative values, so far as they have a practical bearing upon my subject, without further direct allusions on my part. It may be well, however, to note the explanation given by Professor Church that "not one of the pigments employed in these coloured diagrams offers more than a rough approximation to the true hue which it is assumed to represent."

The approximate luminosity of the coloured surfaces reproduced in these circular diagrams, and which have not already been given, are stated by Professor Rood as sea-green (1) = 56·2, and pink (3) = 33·3. The black field of the lower half is not so intense in the original as it might have been, since if we compare it with the black printed outline to the B and R divisions—caused by a slight surface gloss—the former must reflect fully ten per cent. of white or grey light.

In glancing over these descriptive notes I am fully conscious of their very elementary and incomplete nature. Space will not permit me, as I had hopsd, to touch upon, in simple language, the scientific effect of the yellow screen and the coincident results upon the different plates as here shown.

I have to thank Messrs. B J. Edwards for various acts of courtesy in connection with the preparation of these object lessons; also the Britannia Works Co. for early samples of their new isochromatic plates. My experiments with different makers' ordinary and isochromatic gave practically identical results, so that no advantage would result from naming the brand of each particular negative reproduced. The screen used was a light yellow, giving a tint to white paper, when viewed through the lens, almost identical to that yellow-coloured division photographed as (4).

Captain Abney, in one of his *Photography* leaderettes (Feb. 27th, 1890), briefly explored the question of the luminosities of spectral colours in his notably interesting and intelligible style. One of his opening sentences is worth repetition herein:—"A perfect representation of a coloured object in monochrome, be it landscape or figure, has never yet been arrived at, and it seems doubtful if it ever will be attained." Again, in his concluding paragrapb, be writes that "by using plates which are called isochromatic, but are not so in the literal sense of the word, we arrive at results which are truer than when an ordinary plate is employed, and by cutting off the violet (*i e*, by the use of a yellow screen) we come still nearer to the truth." To some practical extent these diagrams will, therefore, re-tell more forcibly the above authoritative conclusions. The subject of *colour*, its visual, scientific, and art aspects, is so intimately related to photography that a thorough course of study, or even but a firm mental grasp of the facts and theories contained in Rood's "Modern Chromatics," or Church's "Colour," could not fail to greatly profit any enthusiastic photograph-maker. Were this a general thing instead of a marked exception we should probably live to find this age noted for a yet more rapid progress in the *truthfulness* of photographic

monochrome pictures. We should, doubtless, also hear and read less of those fatuous efforts of taking *direct* coloured photographs, fresh versions of which crop up in our photographic literature with the regularity and persistence of the great sea-serpent story. The travesties of native *colour*—God's noblest gift to the sight of man—which are occasionally reproduced for our delectation as triumphs in colour-photography, would also be taken at their proper value; and the mind of the average photographer would begin to grasp the fact that when the phonograph has been made to think as well as to speak—that in those days may we expect to see direct photography in colours in all its imaginable pristine beauty and simplicity.

A Lantern Slide Camera.

By Frank P. Perkins, F.I.C.

"Chill airs and wintry winds, my ear
Has grown familiar with your song."

THUS the poet sings, and so sighs many a photographer in these cold, dreary, sunless days, longing for the time when the sky shall once again be bright, and he, shouldering the brown bag, can go into the highways and byeways photoing.

But whilst winter's "wild music is abroad," it is certain that little can be done with the camera out of doors (except snow sets in, when the "detectives" will have rare fun). Let us then endeavour to amuse ourselves at home, and thus "defy the weather," photographically at any rate.

In our last paper we gave a sketch of the collodion process, showing how it might be adapted to the production of lantern slides, printing by contact, or nearly so, being there advocated. To some impetuous ones difficulties might have arisen in this plan of procedure, a cause of vexation in the splitting of films and staining of negatives, notwithstanding our directions for the prevention or removal of these sources of irritation. To them, as well as others who care to read, we will now show how by a little ingenuity a common camera may be adapted to the purpose of copying from the negative, thus entirely precluding such accidents.

The camera we have used in this conversion is a rather ancient half-plate sliding body one, fitted with a portrait lens of eight inches focus.

Now the total length of the copying apparatus our "'prentice hand" has built up from the film of the negative at one end to the collodion film at the other end, for producing a positive of the same proportions as the negative, is thirty-two inches. (*Vide* Enlarging and Reducing Tables.)

On commencing work we found the camera required lengthening just nine inches. The first thing to be done, therefore, was to get a board of the same width as the camera, about three feet long, and to screw across it two pieces of wood of the same thickness as its baseboard, between which the camera could be placed, thus keeping it fixed in its position and lengthening the baseboard—at the focussing glass end—some three or four inches at

same time. A tube of wood nine inches long, the sides of which corresponded in width and thickness with those of the camera, was then made, and four pieces of wood about two inches wide having been screwed to the inner sides of one of its open ends, these formed a shoulder which fitted into the front part of the camera, and served to connect the two parts and prevent light from entering. The back part of the camera fitted in the same way into the other end of the tube.

The camera part of the apparatus was then complete, and by boring a hole through the bottom board, the usual thumbscrew kept the whole compact and firm.

The front part of the apparatus required another tube of the same squareness as the camera, about six inches deep, and closed at one end. In the end was cut a hole quarter-plate size, and on either side of it a bevelled piece of wood—the bevel being placed inwards—was screwed in such a way that a frame—with its edges bevelled outwards—provided with an opening, the size of a lantern plate, could slide up and down, and against which the negative could be fixed. By such means it became possible to get the picture in its right position on the ground glass of the camera, and on the sensitised plate. Of course, a simpler plan might have been adopted; a hole cut in the back of the box of the necessary size, and the negative placed against it and held there by four tacks, for instance; but the chances are that much hammering, &c., would have been required before the right position was found, whereas by the sliding frame the position is gained without trouble, and without endangering the negative.

This box was placed as nearly as possible in its position on the bottom board, and screwed down, and by aid of the rack and pinion of the lens it could soon be finally adjusted. The whole of the new portions of the apparatus were then blacked inside and out, and with the addition of two slight laths connecting the negative box with the camera, and kept in position by a couple of screws on the top of the box, over which the focussing cloth could be thrown when copying was in progress, the apparatus was complete. The workmanship, we acknowledge, is not equal to London cabinet work, but what does it matter; it is neat in appearance without being gaudy, will bear some service, and is efficient.

The negative may either be lighted from a window by admitting the light through tissue paper, or by a powerful oil lamp, the light being diffused in the same way. We have formed a very efficient screen by placing a sheet of tissue paper between two half-plate glasses, and supporting it about two inches from the negative. We have also used the lamp from a small optical lantern with advantage.

By means of such an apparatus good results may be obtained, but for winter work we must confess that we prefer the contact method, the exposure being so much shortened.

Photographing on Wood for Wood Engravers.

By W. J. Rawlings.

IN the first place the wood block must be prepared in such a way as to prevent water penetrating into it, and to give it a uniform colour, also to fill up the pores of the wood to prevent staining.

This is effected by sprinkling a small quantity of zinc white, and adding sufficient albumen, spreading with the ball of the hand until the coating is even and smooth, and finally finishing with a camel-hair brush. The above operation requires some practice to perform successfully, and if rightly done will not give any trouble to the engraver, not even for the finest tints. All blocks will not require the same amount of albumen and zinc white, as some are more porous than others. The right proportion can only be obtained by experience.

When perfectly dry, sensitise by coating as you would for a collodion plate, with the following solution :—

Alcohol	5ozs.
Ether	5ozs.
Pyroxyline	20grs.

when the pyroxyline is dissolved, add 75 grains silver nitrate dissolved in the smallest possible quantity of water.

It is best to keep the above solution in the dark room.

This solution gives a slight film, which must be removed from the block before printing. To do this use cotton wool saturated with the following solution :—

Ether	5ozs.
Alcohol	5ozs.

Dry and coat again with the sensitising solution before quoted, and apply cotton wool saturated as before.

The block is now absolutely left without any film, and is ready for printing under a reversed negative. The most simple and quickest way for fixing the negative and block together for printing is by brass clips made for the purpose (as shown in fig.)



The time required for printing varies according to the intensity of the light and the density of the negative. With a bright day in the summer, with an average negative, 10 to 30 minutes will be found sufficient.

The negative is now removed, and the print is fixed for two or three minutes in a strong solution of hyposulphite of soda, the block then being washed at a tap for about half a minute, when it is placed on its edge to dry. Blocks treated by this process can be produced ready for the engraver under the hour.

A Day with the Camera.

By L. Richards.

HOW many can spare more than this period of time for an outing is not the concern of this paper, but how to put into the day all that can be done photographically is such a desirable "tip" that perhaps the side-light that can be thrown on this question by the writer will be welcomed by many photographers.

Where to go! is the oft-asked question. This it will be impossible to answer, and must depend on all sorts of factors to be settled by each person for themselves. Photo manuals, &c., have more than shown the *how* and *when* to photograph, but a need has existed for someone to show the *where*. The following pages are a brief attempt to lead the photographer to do for himself, and by himself, all that is needful to settle this matter without writing random queries to any photo paper as to where to take his camera for an airing.

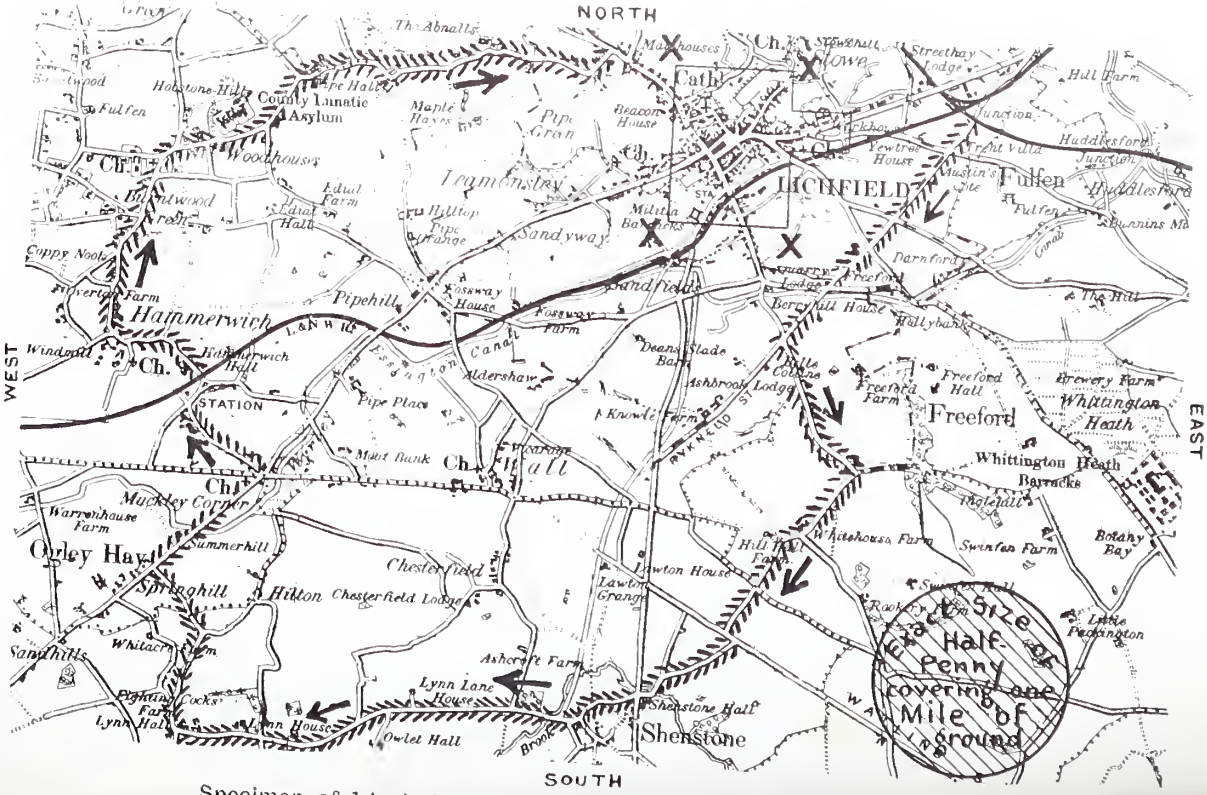
Photography has done much for the arts and sciences, and very much for the science of map production. Allow the writer, therefore, to pay to photography its just due by showing that as photography is useful for the making of maps, they are also most indispensable in the making of photographs. As geography includes all other sciences don't attempt to complete photography by putting it outside geography. As there are secrets in all trades, this article does not propose to tell how maps are made, but only to show how one who makes them uses them for photography.

This matter has taken some sort of shape lately from the felt necessity of photographic surveys of various counties being suggested or in progress. Much nonsense, however, has been written tending to false starts, more because of the lack of any guiding suggestions than of any unwillingness to adopt them.

The maps accompanying this sketch are prepared not as pointing to any particular district to be photographed, or even needing it, but only as illustrative of the text, and to familiarise members of photo societies with the general appearance of maps useful to them for their particular hobby.

Most will agree that when the light enters a picture from the left hand a good result is obtained. When going over strange ground for the first time it is an immense gain to know that your line of route and sight is giving you the best possible view of the country, and also keeps you from the unpleasant necessity of constantly turning round to view the ground to the rear, which must often be done if many good "bits" are to be noted. Again, what is more unpleasant than desiring to look to the rear after passing an interesting young couple on the road in the springtime; your altering step would at once

FIG. 1



Specimen of 1 inch Ordnance Map showing a method of marking route.

make them think that they were being quizzed. This looking back and around also savours of the "spy" or detective, and might get the camera and its owner more attention than was pleasant, and give an idea that the pedestrian has lost his way. In a sense other than military we say, "Eyes front."

Noting that the sun during the day shines in the following directions—



let us apply this to our district and arrange the route to suit. If, therefore, we draw or mark the following curve on the map, we shall obtain a route that will fill all the best conditions of light. The ideal journey partakes of the shape of the letter C U A B If, therefore, a start is made at the point A, thence to B, and finish at C, we shall have our lighting pictorially good. (See fig. 1.) The direction, it will be observed, is S., S.W., W., N.W., and N. for about each 2½ hours of the day from 6 a.m. to 6 p.m.

This order of progress must, of course, be only considered as a general rule subject to local circumstances, and adopted when the photographer has no choice of days or chance of a re-visit. The reader will, of course, see that a reversal of the route will not give so good a working light as from 9 a.m. to 3 p.m.; the sun will either be facing you, or from the right, or behind. It must be, however, remembered that though some effects are best rendered by light thus projected on the landscape, they are exceptional and rarely acceptable. These valuable hours of daylight could, however, be utilised in woodland work.

Will the rain stop? is an oft-asked question in the early hours of the day in the country. If it does the map will again help you, for by projecting your excursion along the roads that are marked with high altitudes, and carefully keeping on the "orthogonal" or crest line of the hills and spurs, the dryest road may be enjoyed; whereas, the photographer who ignores this precaution may go floundering through all sorts of damp experiences. Under these conditions all vicinity of watercourses, unless bridged, should be avoided.

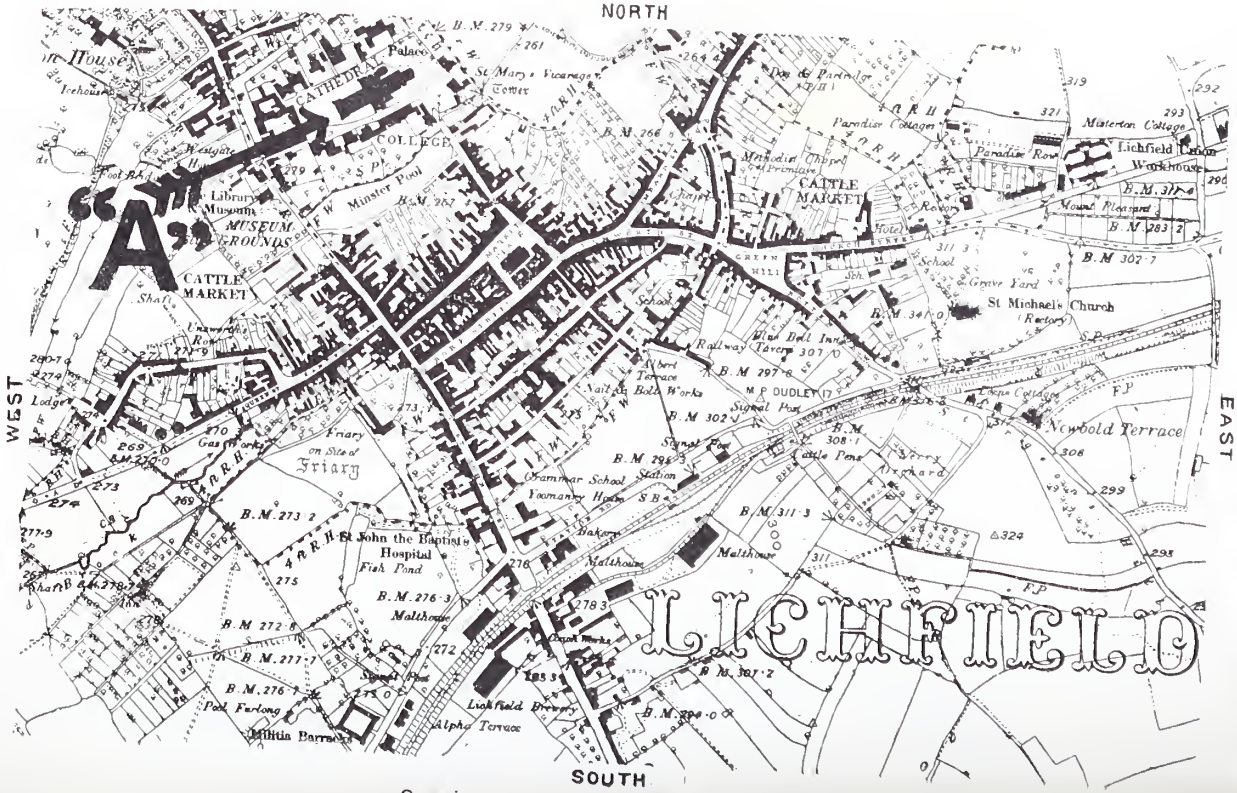
Again, when the weather is dry your map will show you the easy road home, for by its aid the outward route, if arranged up hill, and projected across contours that lay wide apart, and the homeward route across contours that are close together, the gradient outward will be gently upward, and easy to climb, while the return journey will be down hill, and, therefore, convenient and beneficial to the weary limbs of the tourist.

The angle of view of each lens being known it is an easy plan to mark these angles on a small sheet of celluloid, which, when applied to the map, will show the exact position from which to take any desired width of panoramic view at one exposure.

The previous remarks about angles and points of the compass naturally show the necessity of a magnetic compass being fixed to the camera.

Many a time this compass is of vastly more use than the pretty little toy spirit levels in which you are tantalised in watching the tiny bubble play at see-saw up and down the tube, or watching the said bubble race round the brass box trying to find the centre, and about as exasperating as the "pigs in clover" puzzle.

FIG. 2.



Specimen of 6 inch Ordnance Map.

The functions of such levels are much easier fulfilled by the photographer adopting the bricklayers' expedient of "taking two steps backward and shuting one eye."

The photographer may not care to be asked to "box the compass," but it may be N.E.W.S. to him that he can "compass" the box, and ought to do so if this accessory is to be of any real utility.

A caution is necessary, however, in attaching them, for care must be taken to replace all iron screws in the camera by brass ones, in order not to affect the magnetism of the needle. The utility of the compass is often proved by an entry in the exposure book of the magnetic bearing of the view taken, and a fuller use of this instrument would soon put a stop to the error of printing in evening clouds across an eastern view, or the absurdity of a southern view being tricked up with clouds lit up by a northern sun! In woodland work this attachment to your camera is all but indispensable, as in many cases, if the weather is dull and you are in a dense part, magnetic bearings as well as the map are necessary in order to direct your progress.

The ordnance maps should in most cases be used for an accurate topographical reconnaissance of any district, and the following specimens will show at a glance the characteristics of the various scales useful to the touring photographer.

For a general survey of a district the maps on a scale of one inch to a mile will be very useful, and enable the pedestrian or cycling photographer to map out his daily excursions (fig. 1).

The next larger scale necessary for an itinerary is that of six inches to a mile (fig. 2). This covers part of the district shown on fig. 1, and gives the following data, which will be found very useful to a photographer :—

Altitude in feet, contours, fences, woods, trees, public buildings, ruins and the orientation of buildings. This orientation of buildings, if shown on a sufficiently large scale, will settle within a very little the exact time of day in which they may be photographed. The following example will suffice to show the necessity of reading maps for this purpose.

What is more annoying than to find on reaching a building that an hour or more ought to pass before the lens takes off its cap for a salute to the beauty of architecture, to say nothing of the onlookers and others who designedly seek to be included in a free portrait. In other words, "go for" a building, and not hang around like a tramp to be sniffed at by the fussy dog in charge, or warned off by timid caretakers.

This, as previously stated, is of great importance in settling beforehand the probable aspect of the various faces of the buildings. Take, for example, the building marked A on fig. 2; it will be noticed that the map will give a good, general shape of the buildings, and enable the reader to make an enlarged rough sketch of the same if the expense of the 25in. map stands in the way (see fig. 3). One other among the many uses of the 6in. scale map must not be omitted, that of marking on them in red colour the line of view taken and the extent of distance visible. This will be of great assistance in any future visit to the locality. In the margin should be noted local photographic societies, dark rooms available, depôts to renew your stock of plates, and if you are a cyclist as well as a photographer, this margin will not be half wide enough to include all sorts of data that will enable you to "break the record," as well as perhaps smash the camera.

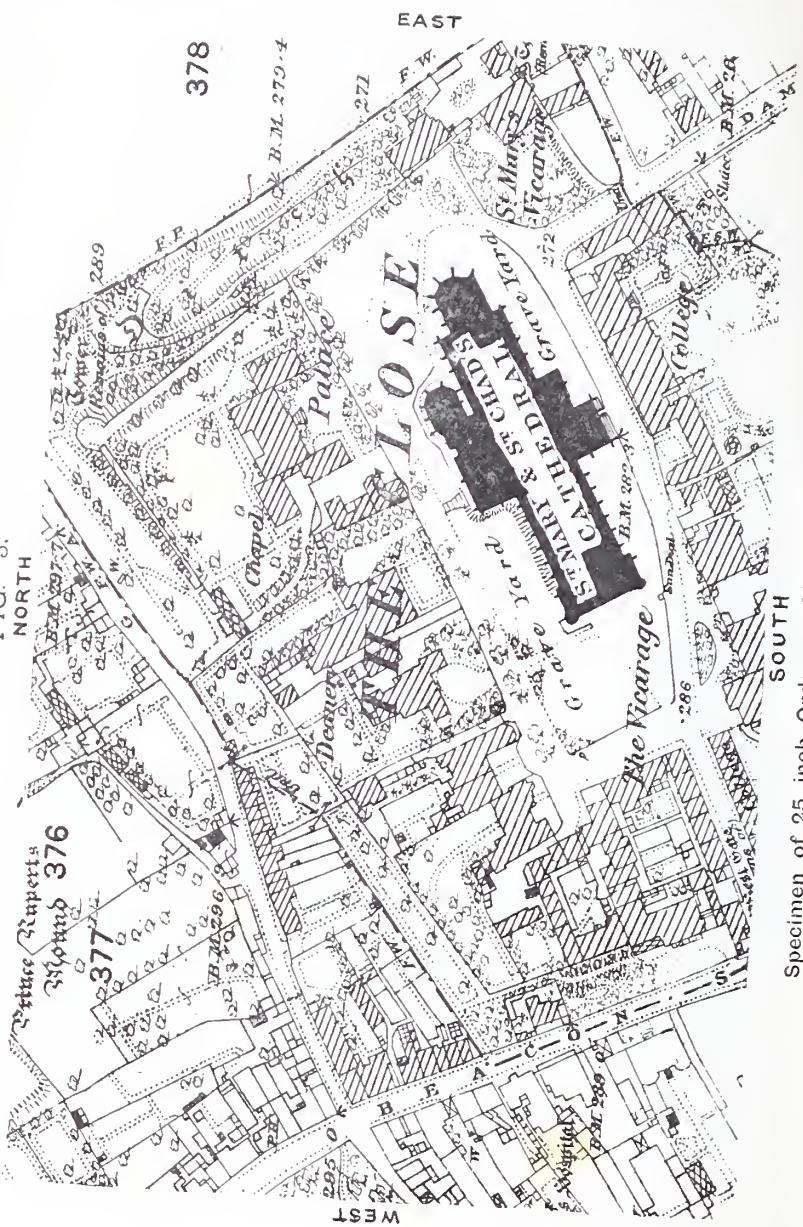


FIG. 8.

Specimen of 25 inch Ordnance Map with buildings hatched.

The comfort and utility of thus marking your maps increase with use, and if they are reproduced in the lantern, are the best illustration of your route.

The historical views of the neighbourhood will be seen on this map, and are shown by distinct types of lettering, viz., Druidical, Roman, or subsequent. The relative importance of other places are shown by a gradation in the character of the lettering.

Plain maps should in all cases be obtained, as on these many details can be shown by colouring. Care, however, should be exercised in the selection of colours, in order that any corrections or inaccuracy may be altered. For this purpose only such colours should be used as are fugitive and easily affected by chemicals. Aniline dyes give such advantage, and though not so artistic as the artist's ordinary colours, yet offer special qualities for map colouring. Do not be persuaded into the purchase of a map highly coloured, which allures you to a park-like expanse coloured green, very "private" in its high "split oak" fence, but photographically not worthy a visit.

If on architecture intent, do not forget that the large scale plans of the ordnance survey take in the dense portions of large towns. See space marked X X on fig. 1. This will give you just the very detail you want, for on these plans you can colour (if so disposed) the exact width of elevation, and any other matters dear to the five orders. A specimen of this plan is seen by reference to fig. 4. By thus giving a "*pre*"-*view* of the locality it will be noticed that a *south view* is best taken about 3 o'clock, a *west view* about 6 o'clock, and after the exposures are over the *review* of the scene will enable you to appreciate the labours of the R.E. in their preparation of these maps.

The latest forms of ordnance maps have had a footnote attached* which it is well for the photographer to digest thoroughly, as it will prevent much unconscious trespassing along occupation roads and other private short cuts; though the writer's camera has before now been the means of mollifying an otherwise hostile occupier of the road, and leading him to think that "maps and camera" meant a new railway coming across his farm.

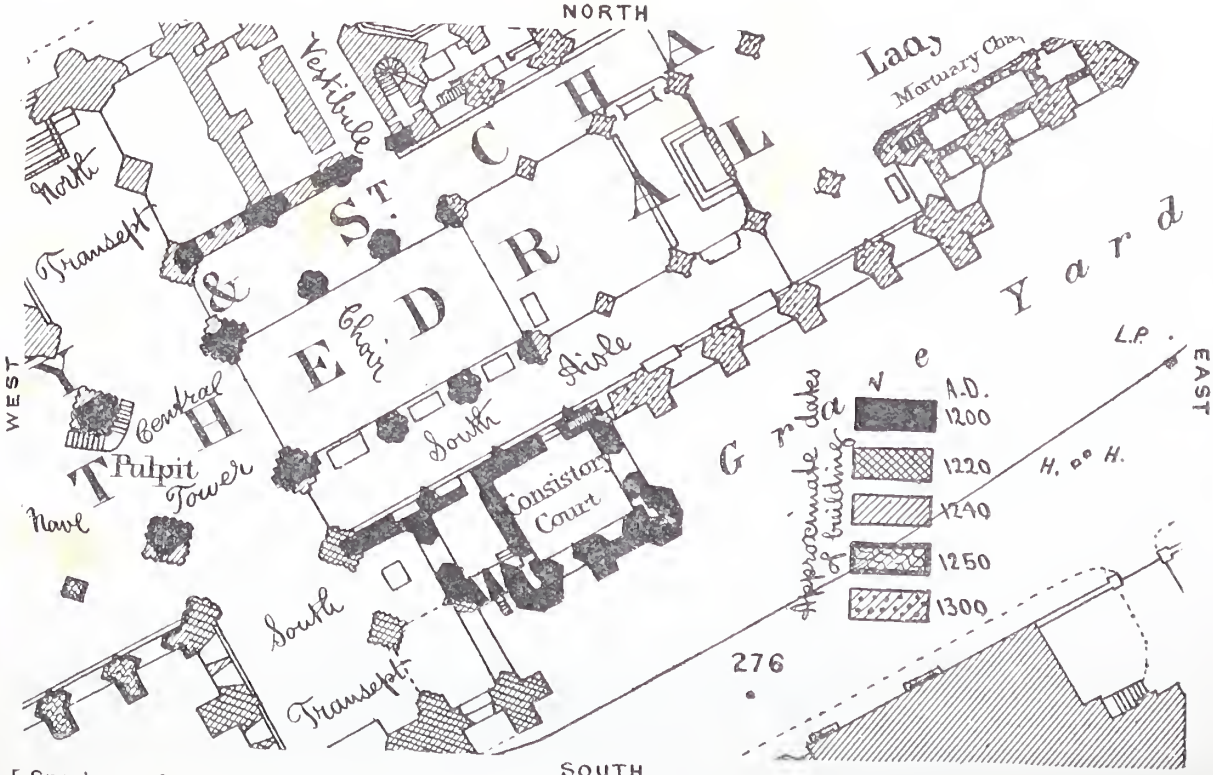
Portability of maps should be next considered. It is rather annoying to find that the hard paper will not fold up and open out many times without showing signs of cracking in the creases. Your copy must therefore be mounted in order to preserve it from tearing. Rude Boreas, who likes to let daylight under the focussing cloth, also delights in playing havoc with a map rather tender in its folds. The obvious precaution therefore must be taken that wind and storm are defied by the map having a substantial backing of cloth. An unmounted photo is called a "scrap," and a map unmounted soon becomes the same.

Can I catch the train? This query often occurs when out on the photo tour. Don't haggle and argue with others about a.m. and p.m. or offer to "toss up" whether you can catch the train; rather take the halfpenny and lay it on the map itself, and then remember that this coin just covers one mile of straight road on the one inch scale, and this distance will take you about one quarter of an hour to accomplish. (See fig 1.)

Vague and funny ideas exist in the minds of many people as to where places are situate, and much time is often wasted in seeking from time-

* N.B.—"The representation on this map of a road, track, or footpath is no evidence of the existence of a 'right of way.'"

FIG 4



[. Specimen of Ordnance Town Plan showing how architectural detail may be endorsed to guide the Photographer.

tables the information that can only be obtained from the perusal of maps. On many a journey, if the light is right, yon may detrain at an intermediate station, and then strike off "up country" to some quiet village or hamlet, and having raided the district for architectnral, topographical, social or biographical "bits," then returning by the top of a deep railway cntting, whither you have climbed for a look round, you suddenly descry the little puff of steam in the distance, which tells together with the tinkle of the bell in the signal cabin below that the "express" is coming: now focussing the signal post in the foreground or the man at the level crossing with the white flag, then making the camera keep its little eye steady on the enlarging cumnlus of steam, watch for the exact instant to make it "wink the other eye" at the mail. This is the work of the drop shntter, and then, after packing up the camera, you smile to yourself that by pulling the cord you succeeded in stopping the express without alarming any passenger or delaying the slow train, which will presently rumble along the same line with you and the precious negative that is bound to take the first prize at the "snapshot" competition.

This article does not profess to extend into the geological advantages of maps, but sufficient is shown to make the photographer say chemistry teaches the *how*, horology shows the *when*, but *geography* fixes the *where* to photograph. Of course, if the reader is merely a worshipper of silver and gold in that form which chinks, and not a depositor of these precions metals in a filmy state on paper, such would not appreciate maps, as in any way helpful to them.

In seeking to get all the information of districts from maps, yon must alter the phrase often heard, viz., "I mnst look *up* the subject," into, "I must look *down* the subject," for the map gives the balloon or down view. Balloon photos are supposed to give the ideal delineation of the earth and its topography; but until names of towns, roads, &c., are grown natnrally on those objects, the days of maps are with ns yet.

The bird's-eye view gives what we want before starting; the camera's eye the picture that is to be, but under the red eye of the developing lamp do not let your eyes get blood-shot in trying to find out where this view was taken. Was it a lych-gate or Lichfield? Parsons' Green or Gretna Green?

If it has a "local habitation and a name," refer to the map to explain where.

The topography of the maps will be a little puzzling to the novice. The first thing that strikes the photographer is that many apparently insignificant things are noted and others omitted.

The key to this enigma lies in the fact that the ordnance maps are prepared for military pnrposes and then modified for the use of the civilian. Space does not permit to give a full list of the abbreviations nsed on this survey, bnt the reader is referred to data published by the Ordnance Office, which gives these particulars. I may merely state in passing that P.H. on the map does not indicate what yon onght to photograph, bnt means a pnblic-house, though these places, of conrse, supply "developing and toning solntions" on draught, but as it is for the photographer, and not for negatives, no dark room is required for their nse, and the presence of "bubbles" in this kind of developer is considered an advantage, and it has even been stated that photographers who were "over-exposed" have rocked themselves while under the action of snch developers.

Again, M.P. on the map often occurs, but don't think that it means the last resting place of our "great unpaid." No! It stands for those things which are charged with being the most unsociable things on earth, two never being seen together, viz., mileposts.

S.D. does not often occur, but if you come across it you may fairly reckon that the tripod should he opened out and the sunbeam trap set to take the object this symbol indicates, viz., a "sun dial"; where these exist other old bits may safely he expected not far off.

If anything makes a photographer feel "at home from home," it is a map.

In counselling a last look round before making a start on your photo tour, remember that one dark slide had better be spared than the map.

While some artists may he ashamed of maps which could tell how the picture was "faked up," I beg pardon, "composed," and would not care to be asked to point the station from which their "view" was taken, let the photographer produce his map in triumph, and be able to show the exact spot where the prize photograph was taken. It will be no "wreck chart" warning of dangerous places to be avoided, but rather where nature was caught *mapping*.

Enlarging by Artificial Light Without a Condenser.

By E. G. Richardson.

THE subject of enlarging is an interesting one to a great number of photographers, and any method of producing good enlargements with certainty, and at small expense, will doubtless be considered a boon by many readers of the Annual.

It will, I think, be granted that of the two ways of producing enlargements, viz., by daylight and by artificial light, the latter is, in the hands of most amateurs, the more certain and convenient. Daylight is continually varying, and it requires some considerable experience, and a certain amount of luck, to make sure of a satisfactory result. Artificial light, on the contrary, is practically constant, and if one good enlargement has been obtained, there is no difficulty in ensuring that the succeeding ones shall be as good, or even better.

Of the various methods of producing enlargements by artificial light generally employed, that involving the use of an enlarging lantern and condenser is, no doubt, the best, but it is at the same time expensive. The use of magnesium wire or ribbon is much cheaper, but, until I adopted the method about to be described, my experience was that there was no certainty of ensuring even illumination of the negative (an absolute essential) by any process involving the waving of the burning wire over the surface of the negative. Some corner or other was sure to receive less than its proper share of light.

The method I wish to call attention to is, briefly, to hang what may be called a gridiron of magnesium wires at a short distance from the negative, a sheet of ground glass being interposed between the wires and the negative, so as to diffuse the light yielded by the burning magnesium wires.

The figures herewith will make the details of the arrangement clear.

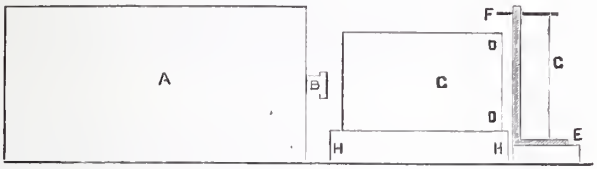


Fig. 1.

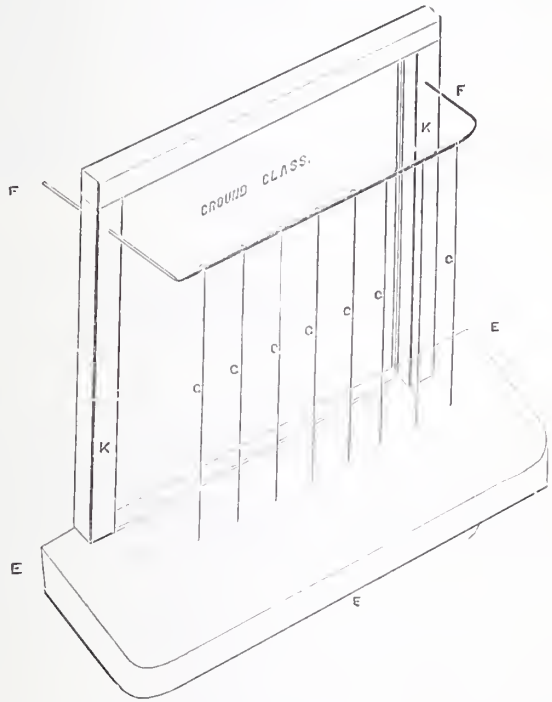


Fig. 2.

In fig. 1, A is a large camera, holding the lens B at the front, and the sheet of bromide paper in the dark slide at the back. C is a small camera with the lens front removed, and the ground glass screen replaced by the negative DD to be enlarged. This camera is raised on a stand HH, so as to bring the centre of the negative opposite the lens B. The focussing cloth should be thrown over the space between the two cameras, so as to keep the light from passing through the lens slit. If this is neglected, the paper is very likely to be fogged.

It is convenient to have the whole of this arrangement so fixed to a long baseboard that the necessary movements of the two cameras when focussing may be easily made without disturbing the parallel position of the negative and the paper, but any arrangement that will ensure this will do, and it will, moreover, be obvious that the large camera may be dispensed with, and a movable easel to hold the paper substituted, provided that some means is adopted of preventing any light reaching the paper except through the lens. In this case, the lens B will, of course, occupy its usual place in the front of the small camera C.

The arrangement for holding the "gridiron" of magnesium wires is seen behind the negative DD. It consists of a wooden baseboard EE, wide enough to extend about 1½in. or 2in. on each side of the largest negative from which it is contemplated to make enlargements, *i.e.*, for a half-plate negative it should be 9½in. or 10½in. wide. At each end and close to the edge is fixed an upright KK, 1½in. or 2in. longer than the shorter side of the aforesaid negative, *i.e.*, for a half-plate negative the uprights should be 7¾in. or 8¾in. high. These uprights are joined together by a crosspiece at the top, so as to make a sort of frame to hold the sheet of ground glass, which diffuses the light of the burning wire.

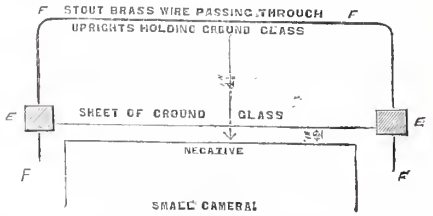


FIG. 3.

Holes are made through each upright near the top to receive the ends of a stout brass wire FF bent to this shape : ⌒ from which the pieces of magnesium wire G hooked at their ends so as to embrace the wire F F are hung. The brass wire FF should slide through the holes in the uprights pretty easily, so as to be capable of being moved nearer to or further from the ground glass. Fig. 2 is a perspective view of this part of the apparatus ; fig. 3 a top view, and fig. 4 a back view. In fig. 4, the magnesium wires G are seen hanging from the brass wire FF at equal distances from each other, so as to cover a space about an inch and a half larger each way than the negative DD, which is shown by dotted lines.

When all is ready, the wires are lighted with a taper and allowed to burn out. The fact that they are not all alight at the same time makes no difference in the result. It is, of course, most essential that the ground glass should be kept clean, as, should any deposit from the burning wire be formed on it, the result would be a mark on the enlargement, owing to some of the light having been interrupted in its passage through the negative.

I find that in dealing with a ½-plate negative of average density, eight pieces of magnesium wire, each about eight inches long, used with stop f/16, are sufficient to enlarge to 12 × 10 inches. The wires are hung about 1½in. from each other, at a distance of 4½ inches from the negative, and the ground

glass is placed about half-an-inch from the negative. I do not think it would be advisable to hang the wires wider apart, as the resulting enlargement would probably show alternate lines of under and over exposure. If the distances recommended be adopted, there will not be the slightest trace of uneven illumination in the enlargement.

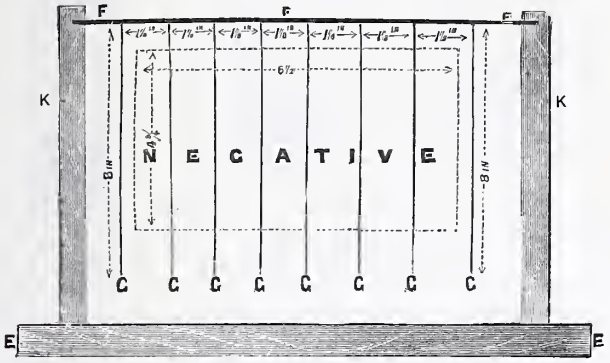


Fig. 4.

It will be obvious that the method above described gives the greatest latitude for accommodating the light to the particular negative being enlarged. More magnesium wires can be used, a larger or smaller stop can be inserted in the lens, a reflector (*e.g.*, a sheet of white cardboard) can be placed so as to send more light through the negative, and either rapid or slow paper can be used.

I am glad to be able to add that the Editor of *Photography* was good enough to say (see note to Mr. Monkhouse's letter in *Photography* of Feb. 4th, 1892) that an enlargement made by this process, which I had sent to him for inspection, was "simply perfect."

I will conclude by stating that the whole credit of the process is due to my friend, Mr. George Mason, late a member of the Camera Club, and an amateur of some years' experience.

An Improved Drop Shutter.

By Arthur Santer.

OF the many shutters that are on the market, probably there are other workers who, like myself, prefer the "good old drop."

By the manner in which it is placed on the lens, the duration of the exposure may be greatly increased. I refer to the method of letting the slide fall in a slanting direction instead of vertical. As, however, this does not always give the desired result, I have designed a slide as under.

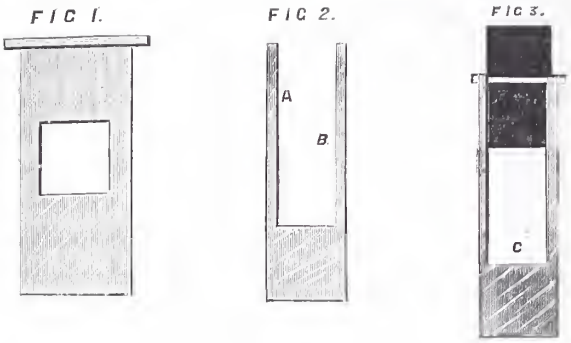


Fig. 1 is intended to represent the slide *only* of shutter as usually made.

Fig. 2 shows the hole continued up to the top of the slide. In the sides A B a groove is cut, into which is fitted a piece of zinc, wood, ferrotype, or other suitable material, which is made to slide up and down, increasing or diminishing the size of opening C, which regulates the exposure as required.

Of course, elastic bands may be used as usual.

Cleansing of Apparatus.

By S. Henry Smith.

PERHAPS there is not, among the thousand and one things that go to make up success in photography, a single one that is more important and yet is done in a more perfunctory manner than the cleansing of apparatus. It is not so attractive as attitudinising beside a camera before a more or less bewitching sitter, and has not in it that element of danger we all love so much that attends seeing how long we can keep an irate old gentleman waiting without hearing him swear, and yet, perhaps, a few hints may not be found out of place either by the professional or amateur photographer. Measures, dishes, glass slabs, etc., if greasy, try slightly warm water and soft soap, using a bottle or nail-brush as the case may be; finish in plentiful rinsing with water. If the grease does not yield to this, use a very strong solution of carbonate of potass (subcarbonate of old days). This saponifies the fats and facilitates their removal. For lime deposits that will not yield to ordinary washing, use a little strong hydrochloric acid. Pyrogallic acid stains, if persistent, use peroxide of hydrogen; for ink stains, use diluted sulphuric acid. All vessels that have contained hypo, wash thoroughly first, then use strong acid (sulphuric or hydrochloric), being careful to run it over the outside as well as the inside of measures, &c. This decomposes the hypo with precipitation of sulphur, but thiosulphate of soda

so permeates the substance of porcelain dishes that even this treatment cannot be looked on as making them absolutely safe, but glass, vulcanite and xylonite are rendered perfectly free if carefully done. Vegetable deposits, pour in strong sulphuric acid, run it round, and pour back into reserve stock, then rinse and finish. For ordinary bottles, use large bottle brush and plenty of water; if greasy fill a quarter full with water, insert a few pieces of stout brown paper, place the hand over the neck, and the bottle on its side, then give the whole a circular movement as quick as possible, so that the paper sweeps round the sides of the bottle well. Take out the paper, use fresh water and paper, and repeat, then finish with soft soap and water; even castor oil bottles yield to this dodge. Bottles with wine stains, use, with care, strong nitric acid. Glass tubes, pipettes, potash bulbs, weighing bottles, and fine apparatus generally, use a mixture of equal parts sulphuric acid and water, mixing the two in a porcelain dish, and allowing the mixture to stand till cold before using, cleanse with water, and drain; then rinse out with pure alcohol or methylated ether, and put in a warm place to dissipate all that will not drain out. With practice the sulphuric acid can be dropped down the finest pipette, otherwise put a small indiarubber ball on the top, so that it can, by pressing and then releasing it, be made to suck up the acid. Burettes, stained with nitrate of silver, use nitric acid. For spoilt microscopic slides, use a covered jar, half full of methylated spirit; in this from time to time place all unsuccessful slides (it is wonderful how the number increases); in two or three days the cover glasses come off; rub the slides by means of the finger and thumb in the spirit till no balsam, &c., adheres, then wash, finish with clean methylated spirit, and polish with wash leather, treat the cover glasses with fresh methylated spirit; with experience you can finish these between the finger and thumb, otherwise cover a couple of corks with wash leather, place the cover glasses between, and polish by giving both a circular movement on their axes. These few hints are not meant to indicate the only methods of cleansing, but to give an idea of those generally adopted in the laboratory, and it is hoped they may prove of service to the uninitiated in the mysteries of the art of bottlewashing.

The Lighting of Photographic Prints.

By Frank M. Sutcliffe.

HANGING on the wall in front of me are three photogravures, in the weak lamplight this evening the one furthest away appears to be very dingy and low in tone, so low that it might have been printed from a much under-developed negative; the one nearest me seems to possess all the good qualities a photograph should have, the tone ranging from deepest black through soft greys up to a few telling high lights; the centre photograph has a chalky look, and, if I did not know, should be puzzled to say what the

dark mass in the left consists of. Yet only a few hours ago these three same photogravures had a very different look when the sun, which came through a western window, fell on them. The dingy one then was anything but dingy. Two dark horses in it looked so velvety that one could almost feel their silky hair, the sun seemed to be really shining on the earth, and the sky might have been full of quivering light, so wonderfully brilliant did the sunshine make this photogravure appear. As for the lighter picture, which looks all right this evening, no matter how I shifted about, I could not persuade myself that I was looking at anything but a faded silver print; blacks there were none, yet this was a proof impression by one of our cleverest engravers. The centre photograph had all its detail brought out by the sunlight, but somehow the whole view looked wrong, perhaps the sky was too white to be pleasing. By this time the reader, who is not in search of formulæ, will perhaps see what I am driving at, namely, that it depends a great deal more upon the strength of the light which falls on a photograph as we look at it than whether that photograph is printed to the *right* depth. Seeing that our white paper is so very much darker than the light of the sky, so sunlit paper must be brighter than paper out of the sun. By viewing our work, therefore, in the sunlight, we shall be able to approach a little nearer to nature's scale, but to do this we must take care to have our deepest shadows very strong, and only the very highest lights white, or we shall only find our tones go up a scale without extension, but owing to the sun's ever-changing altitude and position, it would be impossible to get its rays to fall where we might want them; we should, therefore, do the next best thing, and let as much diffused light as possible on to the photographs in our show rooms and exhibitions. Every exhibitor must have been struck with the varied appearance of his exhibits in different galleries. I remember once at an exhibition being astonished at the heavy dark look my own exhibits had, which, when in my studio, seemed to be quite light, and only last spring, at Liverpool, the critic of *Photography* said of one of my exhibits that it had been printed beyond the border line of paleness, and was very weak and faint, yet when this identical print was framed it appeared in the dull January light to be, if anything, too dark, I know it was substituted for a darker print as the better one of two, but when I saw this platinotype later in the year on the walls of the exhibition I found your critic was right, for the flood of light in the rooms of the Walker Art Gallery made the print look very pale indeed. Perhaps, by the way, the wonderful success the Liverpool folk have with their exhibitions is partly owing to the grand light in which the photographs are shown. If exhibitors only knew whether their work was to be hung in a good or bad light they could print their work accordingly; hangers, too, might study this subject.

Lantern Slides on Wet Collodion.

By W. T. Wilkinson.

Collodion.—Mawson's collodion, iodised and allowed to settle for at least three weeks, decant carefully into small bottles, and only use about one-half, then fill up again and allow twenty-four hours to again settle.

Silver Bath.

Nitrate of silver	1½ ounces.
Distilled water	5 ,,

Dissolve the silver in this, add 2 grains of iodide of calcium or ½ of ammonia, or 10 drops of iodised collodion, shake well, then add 15 ounces of distilled water, filter through a pledget of cotton wool stuffed into the neck of a glass funnel, and add 5 drops of pure nitric acid.

Developer.

Sulphate of iron	1 ounce.
Acetic acid	1 ,,
Water	20 ,,

Adding spirits of wine (not methylated) as required, to make the developer flow over the film; whiskey, or brandy, or gin may be used for this purpose, when spirits of wine are not available.

Fixing Bath.

Cyanide of potash	2 ounces.
Water	20 ,,

Toning Bath.

Ferricyanide of potash	¼ ounce.
Nitrate of uranium	¼ ,,
Sulphide potassium	2 ounces.
Water	20 ,,

Dissolve the sulphide first, then add the other ingredients one at a time, make up also a saturated solution of sulphide of potassium with which to make the solution work when it gets sluggish.

The glass plates used must be of good quality and thin, either crown or best polished sheet are best; glass that has been used for dry gelatine plates is not good. The glass plates are soaked in a mixture of nitric acid and water, when taken from this must be scrubbed with a rag and put into clean water, from this they are taken and well washed under the tap, rubbed with a clean sponge again, rinsed under the tap and flooded with

Albumen (white of egg)	1 ounce.
Water	20 ounces.
Ammonia	10 drops.

100 grains of dried albumen (Thomas's) may be substituted for the fresh albumen. This must be carefully filtered before use, the plates as coated

being reared one against the other to dry; of course, only touching in as small a portion of top edge as possible. The room in which these plates are dried must be quite free from dust, and be warm.

The silver bath must be used in a dipping bath, a flat dish being too apt to accumulate dust; the dipping bath must be emptied each day, well washed out, and put upside down upon clean blotting paper till again wanted, the silver solution must always be filtered before use.

Always dust the plate with a clean brush before coating with collodion; use a pneumatic holder when coating with collodion, because the plate being small, the heat of the hand is apt to cause an uneven film. Allow the plate to remain in the bath sufficiently long to ensure a thorough conversion of the salts in the collodion, drain thoroughly, wipe the back of plate before putting into the dark slide, and don't try to use a dry plate dark slide for this process.

Expose well, develope till all detail is out, holding the plate either on a holder or in the fingers; don't try to use a dish, as it is useless; wash the developer off thoroughly, then immerse in cyanide solution, which should be kept in a dipping bath; cyanide only must be used; hyposulphite of soda will spoil the slide absolutely. Wash the plate thoroughly under the tap, and to be certain that all the cyanide is removed, flood the plate with a little of

Iron developer	1 ounce.
Water	5 ,,

Then drain and immerse in the toning solution (which should also be used in a dipping bath); move the dipper up and down until the slide is of the desired colour, viz, a fine peacock blue, inclining to purple; again wash, and put away to dry.

When dry, warm in front of a bright fire, and varnish with well-filtered spirit varnish.

The "Photography" Hand Camera.

By C. Wood.

In the construction of a hand camera several things have to be considered, the storing of a number of plates—not less than twelve—the means of bringing each of these plates under the influence of the light, and the return of the plate to the store, and this has to be done in such a way as to prevent light admitted during exposure, shutter setting, &c., injuriously affecting those in store. Besides these, the arrangement of lens and shutter, the regulating of shutter speed or (what is very often its equivalent) the regulation of lens aperture, the position of a finder or finders, and the most convenient method of doing necessary inside work from the outside must be determined, as well as the final appearance of the complete article.

It is proposed to consider each of these, in some cases giving reasons for the plan adopted, and in others suggesting alternative methods to suit

varying conditions of available lenses and shutters, or of desired appearance when complete.

A great many different kinds are in the market, some very simple and others intricate, still it is believed that in the one now about to be described a form is indicated lending itself admirably to home manufacture, and capable of being elaborated to almost any degree to suit the varying skill of those who attempt such work. In its simpler states an instrument may be readily made capable of doing good work with certainty and ease, and with the more complex forms work may be done under conditions which would render very many hand cameras useless. The brass work, too, is well within the reach of the average home worker, and the production of a very presentable case may be managed by following the directions given.

The camera will measure $7\frac{3}{4}$ by $7\frac{3}{4}$ by $4\frac{3}{4}$ inches, and the length from front to back may be reduced if a lens of shorter focal length than five inches be adopted. It holds from 24 to 28 plates, according to the thickness of the glass used, and, as a rule, may be made to hold from 6 to 10 plates for every inch of back focus of the lens. The plates are stored in a magazine, from which they are drawn as required and afterwards returned. They require no backing, and are not liable to scratches. The movement for placing the plate in position for exposure is a double one, but inter-locked so that it would be impossible to effect it improperly. The return to the magazine is direct, and is also locked by the same device. There is plenty of room in the case for finders, &c , and its length is not so great as that of forms in which room must be found for a dozen plates in sheaths behind the camera proper. The novelty claimed for this particular hand camera is in the method of changing plates, the inter-locking of movements for the same, the locking of shutter stud, and the idea of introducing a swing back. Any arrangement of lens, shutter, finder, or case may be used other than those suggested.

With regard to sheaths for the plates—these may be used, and directions for their construction will be given, but in the course of several years, during which a camera changing plates as here described has been in very frequent use, no plate has ever been sheathed, or scratched. Pinholes from dust have occurred, but better workmanship might have prevented them from the first, just as greater care in filling the magazine, and an occasional brushing out certainly cured the annoyance. If one plate simply rests upon another, film to back, no harm is likely to follow if all surfaces are previously lightly brushed. If the glass is defective, or if excess of emulsion is to be found on the back, markings in consequence would be expected, though, as has been said, none have appeared. But plates do not remain in this position, and here it is that care must be taken. One plate will not damage another when the surfaces in contact slide one upon the other, and it should not be possible during any movement of the plates for a sensitive surface to be touched by anything but a surface. In the method of changing adopted in this hand camera, a corner or edge of a plate never touches, slides over, or scrapes against the film side, only against the back of the plate. Hence the immunity from scratches. An advantage gained by the use of sheaths will, however, be indicated later on.

The plates are contained in a magazine at the top of the camera, just over the actual exposure chamber, and stand upright on their edges, with their film sides turned towards the lens. The bottom of this magazine is

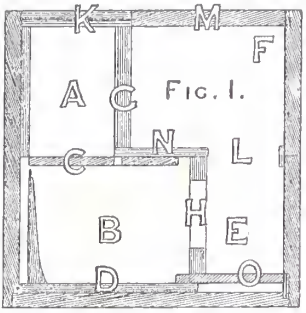


Fig. 1.

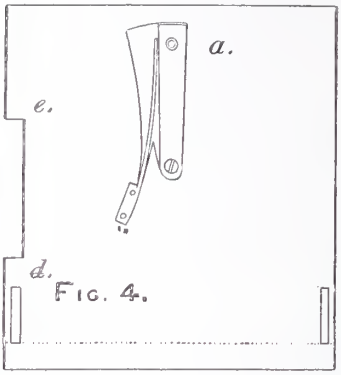
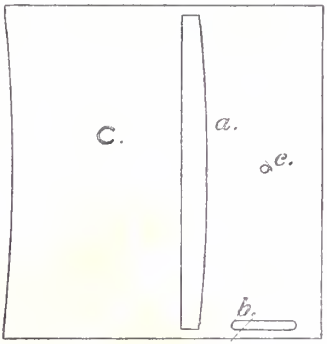


Fig. 4.

Fig. 2.



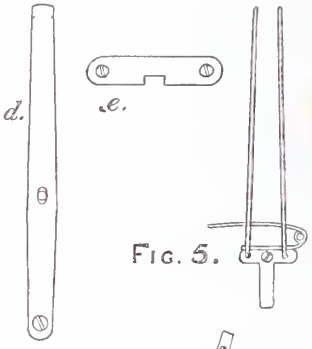


Fig. 5.

Fig. 3.

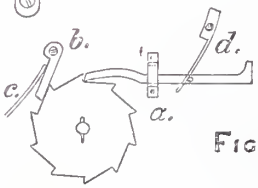


Fig. 6.

capable of a sliding motion backwards and forwards of about a quarter of an inch, so that when moved backwards there is room for a plate from the front to drop into a sliding holder. When a plate has thus fallen the aperture through which it descended from the magazine is closed, and the plate holder brought into position just under the back of the magazine, and firmly held there by a spring or springs at such a distance from the lens as to receive a sharply focussed representation of a distant object. After the exposure has been made the camera is inverted, and the sliding bottom of magazine moved forward, when the plate falls back into the magazine, this time at the rear.

As the magazine may be made from one to three inches broad, the sliding plate holder will have this amount of motion, and at any part of this space it may be retained so as to suit a lens of shorter focus used on the camera, or an arrangement of focussing by altering the distance of the plate from the lens may well be adopted. The chief advantage gained by this power of placing the plate at a variable distance from the lens is that referred to of introducing a swing back which shall be automatic in its action. This will be effected by allowing the plate to fall into a cell or sheath pivoted at its centre (of height), and weighted at the bottom in order to keep it upright, when the camera itself might be inclined upwards or downwards. This swinging cell can be rigidly fixed in an upright position when at its nearest point to the lens by being brought against four pins or studs, two in each side of the camera. And also at its furthest from the lens it can again be secured in a similar position, thus allowing the plate to be received for exposure and returned afterwards, just as though no swing back had been adopted. A point half-an-inch forward from its position when the plate is returned may be selected for its position during exposure. The plate should have no looseness or "shake" in its cell, so means of pressing it against the front of the cell will be described, yet at the same time allowing it to fall freely into the cell, and releasing it readily when returned. The distance of the centre of the plate from the lens would, of course, be a constant quantity, although its upper or lower edges might approach or recede from the lens according as the camera was pointed upwards or downwards. If not actually required it should be possible to lock this swing back.

The materials for the body of the camera should be quarter-inch mahogany, straight in the grain, and the corners of the box should be dovetailed. If this be too difficult they may be screwed together, or a lighter wood may be substituted, and all be made of deal. In this case, too, they should be dovetailed, or, if screwing be resorted to, ⅝in. stuff may be used. Of the pieces required, two should be 8in. square, three 8in. by 5in., three 5in. by 5in., three 5in. by 3½in., three 5in. by 3in. These sizes will be reduced to the actual sizes given in the drawings. The general arrangement may be seen from fig. 1, which is on a smaller scale than the others, and whose letters will be frequently used to stand for the actual parts they designate. A is the magazine, with its sliding bottom C, B is the camera proper, and D the plate-holder. C is moved by a lever projecting through a slot in the right-hand side of the instrument, and D is moved by a stud or pin passing through a slot in the bottom. The lens and shutter will be at E, while room for finders may be had at F. If the corners be dovetailed the grain of the wood should, for the sides, front and back, be horizontal, but if screwed the grain of the wood in the ends should be vertical, so as to take the screws

more readily. Grooves $\frac{1}{8}$in. in depth should be cut for the front of magazine (G), the front of camera (H), and the sliders C and D, and the groove for the front of camera (H) may, with advantage, be carried right up to the top, so as to allow H to be entirely removed if required. If this be not done the lens had better be carried by an ordinary rising front to facilitate its removal for cleaning, &c., when the lens does not project backwards into the camera. A groove, too, should be cut for the sliding cover (K) of the magazine. All grooves and apertures should be cut before the sides and ends are joined together, and it would be well to cut a piece out of the back, through which the slider C may be inserted. This will prevent the annoyance of discovering (after the sides and ends are finally glued up) that C requires alteration or adjustment. The piece cut out would be replaced before covering. D can always be got at, and lifted out by unscrewing the bottom. If H be made a fixture, the aperture for the lens should be cut, as directed, before it is fastened into position.

Instead of the lens having its centre exactly opposite to the centre of the plate, it had better—if no swing back be added—be opposite a point $1\frac{7}{8}$ inches above the lower edge of the plate, so as to bring the horizontal line in the photograph about $\frac{2}{5}$ of the height of same from the bottom. This will usually produce a more pleasing result, and in the case of subjects requiring a very high horizon (*e g.*, cliff scenery from above) the camera may be inverted for exposure. For such cases a shutter dependent on gravity for its closing is quite inadmissible. The front of camera should, of course, have a hole opposite the lens; this should be rectangular, and of such a size that with the largest stop it is desired to use in the lens every part of the plate to the required margin shall have the full value of the lens, while, at the same time, no light is allowed to fall unnecessarily on the sides, &c., of the exposure chamber. In other words, the aperture should be large enough to permit any part of the plate being seen through any part of the lens visible through the diaphragm and the hole, and no larger. If deemed more convenient the front may be divided into two equal parts—the upper part to be a fixture and the lower part movable, for getting at lens, diaphragms or shutter. This movable part need not be hinged, but have a fillet at the back of its upper edge, which will slip under and hold it to the upper part, and be secured to the base of the camera by a hook in the latter. A disc of tin, hammered slightly convex to stiffen it, may be used as a shield to cover the aperture in the camera front. The sliding cover of the magazine (K) may be made to lift out entirely, when brought to the front end of its groove, and a cover hinged to the camera front (M) may fill up the space remaining when K is closed.

Fig. 2 is a plan of the sliding piece, C showing the aperture (*a*) through which the plate falls. In shaping this aperture the side (nearest C in the diagram) should be perfectly straight, and when closed should correspond exactly with the line of the front side of the magazine. If otherwise it will (being oblique) commence to open at one part sooner, and consequently in a greater degree, than at the other, and the plate will not drop true, but will have a tendency to stick. The opposite side of this aperture does not require such exactitude provided there is room for the plate to pass through. Sheaths will require the magazine, apertures, and exposure chamber to be made slightly larger than when unsheathed plates are used. At the back of C no aperture is required—the end should be shaped as in the diagram, so that

when a plate is returned to the magazine its sensitive surface will be protected. The hollow curve will prevent the film side touching C except at the edges. And here it may be remarked that, although sheaths are not required for the protection of the plate, a definite gain may follow their use. In passing the plates from magazine to plate-holder a glass of dimensions somewhat more than ordinary may "stick" in the movement, but with sheaths of uniform size, where one would pass another would follow, and if the plate was too large for the sheath it would be discarded before reaching the magazine. And again in the lever action for moving C backwards or forwards as required, the amount of movement is determined by the thickness of the plate, while with sheaths this movement would be a constant quantity.

The slider C is moved by a screw stud (*c*) which passes upwards through a slot in N, and is held by a lever (*d*) fastened at one end to a screw in N, and with the other end projecting $\frac{1}{4}$ inch through a slot about $1\frac{1}{2}$ inches long in the side of the camera. A slight curve is given to this lever, which is screwed on with the concave side of the curve uppermost, for the purpose of pressing the free end upwards with some force against the upper edge of the slot. Here a piece of brass (*e*) is screwed on with a shallow notch in its lower edge, into which notch the lever fits when the bottom of the magazine is closed by C.

The plate-holder D is shown in figs. 3 and 4. Fig. 3 is a projection showing how the plate is held against two brackets (*a*) and (*b*). The arched wire (*c*) prevents the plate from falling backwards, but is sufficiently distant from the brackets to allow the thickest plate likely to be used about $\frac{1}{16}$ inch of play. In the original model the back of the plate when in position for exposure came against two springs fastened to the back of the exposure chamber, and which were released by the sliding of C forwards. This was not really necessary, since a piece of watch spring fastened in the same place would be strong enough to keep the plate forward and yet allow of its return, or the wire C might be arranged to effect it. Fig. 4 is a plan of the bottom of D, the stud for moving which is not fixed directly to D, but at the end of a piece of brass two inches long, the other end being screwed to D and capable of moving on this screw as a pivot. This lever is sunk into the under surface of D, and its free end, carrying the stud projecting outside, has a play of about $\frac{1}{2}$in. and a wire spring as shown for pressing it towards (*a*). At each end of the slot, in the bottom of camera, is a notch, into which the stud is pressed by this spring so as to keep D in its required position. The recess (*d e*) is for the purpose of actuating the interlocking arrangement by which the accident of letting a plate down from the magazine when D was not in position to receive it is prevented. This occurred in the early use of the camera, and various plans were tried of curing the defect. Eventually a T shaped lever was introduced. This is shown in fig 5. The lower arm is moved backwards or forwards by the movement of D, making the cross arms ascend or descend. In holes in these cross arms wires are loosely pivoted. These lead upwards through the aperture (*b*) in C, and through holes in N, one each side of the lever for moving C, and when the T is upright, prevents the lever being moved from its notch. The action is this. When D is brought forward (*d*) presses the lower part of the T aside, the arm of the T, nearest the back of the camera, descends, and with it its wire. C may now be moved backwards, so as to open the front of the magazine for the descent of the plate. When D is back as far as it will

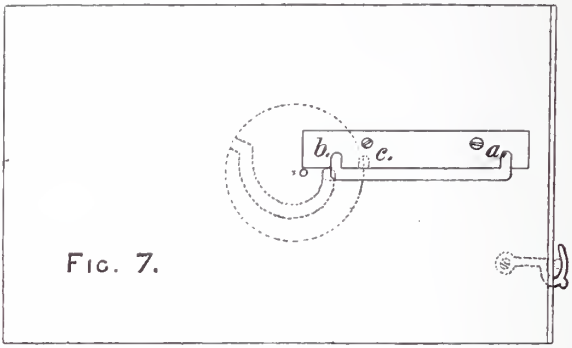


FIG. 7.

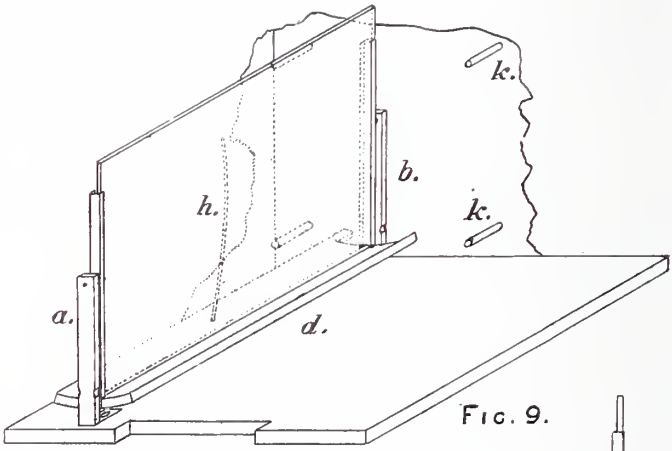
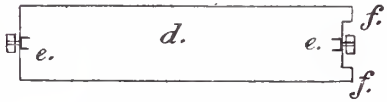


FIG. 9.



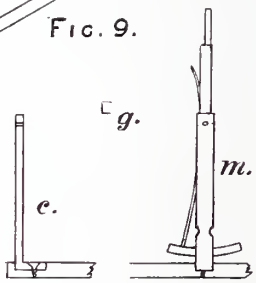
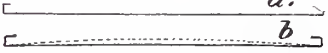




FIG. 8.

FIG. 10.





go this is reversed, the other arm of the T descends, and, when the camera is inverted, C may be moved forwards so as to permit the return of the plate to the magazine.

With 24 plates or more in the camera, a means of recording the number used, although not a necessity, is very desirable. An "index" might be made in the form of a revolving wheel or disc of the shape indicated in fig. 6, bearing numbers from 0 to 9, and fixed on the inside of the camera at L (fig. 1). A hole $\frac{1}{4}$ inch in diameter, and having its outward edge bevelled off, should be make in the side of the camera, so that these figures may be seen in succession. This disc has 10 teeth, and is moved by a brass bolt $\frac{1}{8}$ inch square, actuated by the lever belonging to C, and passing through suitable staples of wood or brass (*a a*), while the click (*b*) with its spring (*c*) prevents its being turned backwards. Another spring (*d*) replaces the bolt after being pressed forward—a better plan than fastening the bolt directly to the lever. This numbering from 0 to 9 will be found very convenient, it being set to the zero each time of filling, as it is presumed the operator himself would mentally distinguish between 7 and 17, or between 4, 14 and 24. Fig. 7 is a plan of the bottom of the camera, with its slot and notches. A piece of thin brass is screwed on one side of this slot, and in it the notches are cut. They had better be filed very shallow at first, until it is found that it is possible to pass plates properly by means of C and D from the front to the back of the magazine. Afterwards deepen them. When the stud is in notch (*a*), the straight edges of the brackets should be exactly in a line with the front of the magazine, so that a plate will easily slide from one to the other without catching either the bracket or the arched wire. When the stud is in notch (*b*), the thickest plate likely to be used (or the sheath, if adopted) should, in sliding from D to the magazine, just clear the back of the latter. Whatever lens be used, its distance from the plate when in position—that is, when stud is in notch (*b*)—should be such that an ordinary landscape or architectural view would be in sharp focus when used with largest stop. In order to effect such adjustment accurately, a hole $\frac{1}{2}$ inch in diameter may be left in the back of the camera until the adjustment of the lens is made. If it be wished to focus by moving the plate an extra notch (*c*) about $\frac{1}{4}$ inch nearer (*a*) should be used in determining position of lens. This will allow objects to be focussed (by reference to a scale on a revolving disc) when so near as 9 or 10 feet. This disc is shown in fig. 8, and should be on the outside of the camera. The stud must be brought to notch (*b*) when returning plate to store.

If the swing back be decided upon it will be necessary to substitute for the brackets of D two smaller ones of brass (*c*) about two inches high, having holes $1\frac{7}{8}$ inches above the surfaces of D. These are for the pivots of the swinging cell. This cell will have for its base a piece of brass $\frac{1}{8}$ thick, $4\frac{1}{2}$ inches long, and one inch wide. The shape of this piece is shown at (*d*) fig. 9. The nicks (*e e*) are to receive the upright sides or ends of the cell, which should be made of thin brass bent into the shape of (*g*). These are soldered into the nicks. The projecting pieces at (*f*) are to limit the swing of the cell, on each side, to an angle of 10° from the vertical. The pivots for swinging the cell are soldered into the ends exactly $1\frac{5}{8}$ inches above the floor of the cell. In order to keep the plate against the front edges of the cell a spring (*h*) made of wire is inserted into (*d*), as shown. This is sufficiently strong to keep the plate forward, and yet should offer no opposition to the descent or release of

the plate. Studs (*k k*) projecting ½ inch from the inside of the camera arrest the swinging of the cell when passing the plates from or to the magazine, and by the interlocking (fig. 5) there is no danger of the plate being let down without the cell being there to receive it. In order to economise vertical space the section of the piece (*d*) had better be an arc of a circle, as shown at (*m*), where the centre of the curve is the point of suspension. If it be thought advisable to lock the swing back in a vertical position—if it be not necessary to use it on any occasion, or should the camera be required for use on its side to obtain an "upright" picture—a convenient way of doing this is suggested. A hole is drilled in the middle line of (*d*) about an inch from one end, and a small "wood" screw is inserted in D, so that when it is turned up it shall engage in this hole. The upper end of this screw should be filed into the shape of a cone, and the lower end squared to take a watch key, which would be inserted through a suitable hole in the bottom of the camera. This fixing should be done when the cell is in position for receiving the plate. The cell should be tested with a plate of average thickness, and the strength of spring (*h*) adjusted, and if the plate does not hang exactly upright (*d*) will require to be filed down a little—most likely on the side nearest the lens.

The camera with this arrangement will require to be carefully guarded from any violent shock when in position immediately before exposure, but will automatically accommodate itself to any gentle but constant motion, and when it has to be deliberately pointed upwards or downwards for the sake of including the amount of subject required, the plate will remain upright. The lens had, in this case, better be exactly opposite the centre of the plate, and the finder should give at top and bottom rather less than the same amount of subject as the plate includes when vertical. This is the great, and almost the only, use of a finder—a view meter. When the plate is fixed in a vertical position, it is only necessary to decide mentally on a point in the desired view, and exactly on a level with the instrument. Hold the camera on a level with the eye, and, directing one of its horizontal and longitudinal edges towards this point, and without a finder, an architectural subject would present no faulty perpendiculars on development, provided the lens used was rectilinear. One finder will be sufficient, and this should be placed just over the indicator of the number of plates used. It should be placed well in from the side of the camera, so that the screen would be sunk sufficiently to do without a shield.

Sheaths may be made of slight tin, blackened, or of ferrotype metal. Their section should be as shown in fig. 10 (*a*), and be perfectly uniform in size. Very great care will be necessary in making them to avoid spreading the metal when bending the edges. They should be made from sheets measuring 4¾in. × 3¼in. In order to get them to hold the plates securely, they should be bent into the form shown in (*b*), when the amount of spring in the back will be sufficient to effect this. Instead of being the full size of the plate they may, if preferred, be made as (*c*), with catches $\frac{1}{16}$in. broad, turned up at top and bottom. Plates can be placed in these very readily, but a groove for the reception of these projections should be cut in the bottom and cover of the magazine. Provision should also be made for them in the exposure chamber.

An economical method of covering the camera, when otherwise completed, will be with strong brown holland or coarse linen. This should be cut

to size—about 40in. by 9in.—and well covered with stiff paste such as used by bookbinders, &c. The camera may also be coated with the paste and laid side downwards upon this coated surface of the holland, which should then be turned over the back and the other side so that both ends of the piece should meet at the front of the camera, overlapping for ½ inch. Trim off the top and bottom, leaving just sufficient to turn over the edges. Turn these in, press out all air bubbles, roughnesses, &c., with a small paper-knife or bone folder, and allow it to remain until dry. Now with a sharp knife and a ruler cut through the holland where doubled over the front, and with the point of the knife raise up the overlapping piece sufficiently to remove the detached piece underneath. Remove also the other loose strip. Apply a little fresh paste and press down the edge previously turned up, smoothing it over with the paper-knife. This will make a very neat joint, and be probably much better than if this had been attempted at the first pasting Apply holland in the same way to the top of K, the cover (M), and to the movable part of the front, if divided, cutting the material through and working it neatly around the edges of any aperture of front or side of camera. When all is perfectly dry and hard, see that all pieces needing such care can be properly moved, and then give two coats of Aspinall's enamel, allowing it to dry thoroughly between each coat, and, if necessary, rubbing down with pumicestone after the first. This will produce a good surface, and probably be a greater success than could have been obtained with American leather cloth. If leather be used to cover the camera it should be put on in the same way, excepting that the edges should have been shaved very thin with a sharp knife, and that any joinings should be near or follow the upright edges or corners. Instead of affixing a handle to the top of the camera where it must be fastened to K and M, straining the hinges and fastening of the latter, it would be better to carry it by a book or parcel strap going right round the instrument and secured by the ordinary buckles. If preferred, the top might be covered by a flap. This should be made of stout cardboard, covered with holland and enamelled in the same way. Where it is required to bend over the edges of the top, there should be only the double thickness of the holland, making a joint. The flap can be affixed by paste and tacks or screws to the camera, and had better be fastened on when both flap and camera have been rubbed down after their first coat of enamel.

The lens shown on the camera in fig. 11 is one of Messrs. Taylor, Taylor and Hobson's 5in. detective lenses, and the arrangement of parts in the instrument lends itself very well to their series. There is room on the camera shown for one of their 6in. lenses—the front of the exposure chamber being brought an inch forwards—while with the former size the swing back may be added without lengthening the camera the ¾in. a less compact lens would require. Fig. 12 shows the shutter release, which is locked by the lever (A) shown in fig. 11, moved by D when brought to the front, coming against a small disc on the discharging stud, and preventing an accidental exposure by the stud being touched prematurely.

If, after exposure and the return of the plate, the shutter is set before D be brought forwards, D may then be placed in position ready for the reception of a plate, and remain there until the next shot, when, upon letting down a plate and bringing it into focus, the shutter is ready, or if the plate be not used as expected, D may be brought half an inch or so forward, and remain

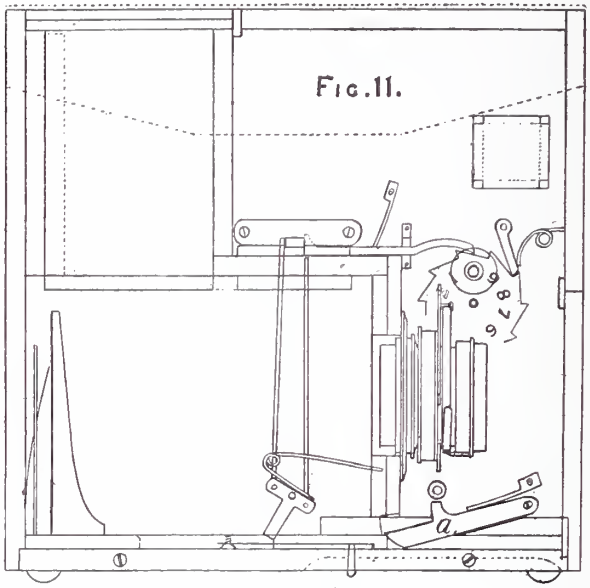


Fig. 11.

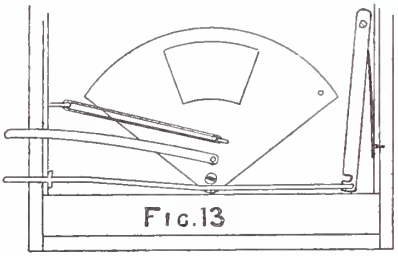


Fig. 13

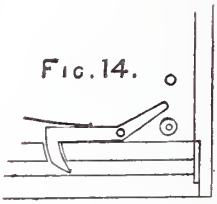


Fig. 14.

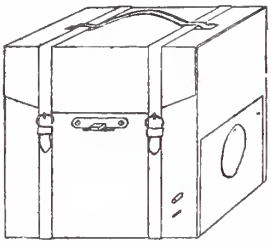


Fig. 15.

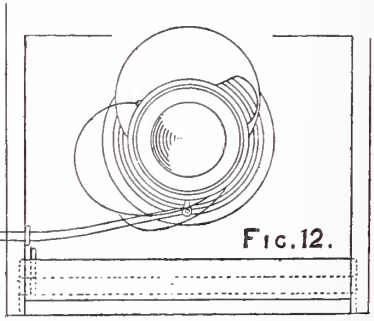


Fig. 12.

there with the plate in safety since the shutter has been "locked." To get at the iris or set the shutter, remove the lower part of front, and as there need not be a plate in the camera proper, there is no necessity for the usual capping of the lens required with cameras having a plate always behind the lens.

For those who will make their own shutters, a very convenient form is a fan (or "sector") shaped piece of brass or tin, pivoted on a screw near the meeting point of its radiating sides, and moved by an elastic band attached at one end to a hook in the camera side and at the other to a stud on the moving part of the shutter. This is readily set by a brass rod, $\frac{3}{16}$in. in dameter, fastened loosely to a pin or stud in the "sector," and projecting half an inch through the camera. Pushing the rod in sets the shutter, when it is held by a spring catch of the shape indicated in fig. 13, and having connected to it a rod or wire $\frac{1}{8}$in. thick projecting through the side, just below the rod for setting the shutter. This lower rod, which carries a $\frac{1}{4}$in. disc or collar to prevent it projecting too far through the case, is for discharging, and in order to avoid failure from the camera being pushed sideways during the act of exposure, it is arranged that the shutter goes off when this discharging rod has been pushed through half only of its scope of movement. In other words, when the discharge takes place, the piece actually pressed to effect it has still nearly $\frac{1}{4}$in. to move before it reaches its stop. The release, too, is exceedingly light. In order to prevent the shutter being set off at an improper time, it can be locked in a way resembling that adopted for Messrs. Taylor's lens. Fig. 14 shows this arrangement. A lever has one end pressed down through a hole in the piece O (fig 1), where it rests upon D, excepting when D is drawn backwards, and out of the reach of the curved end, when the spring shown presses it down, raising the other end at the same time just clear of the disc. Here it may be remarked that all springs figured can be made of brass wire if preferred.

It is recommended to keep a piece of wood in the magazine, just too large to descend through the aperture in C—for the purpose of avoiding the loss of plates by beginning the series over again. If an indicator be fixed, this is not needed. It will be seen that with three exceptions, fig. 1, fig. 10 (*c*), and fig. 15, all the diagrams are to scale, as given on page 264. Fig. 11 contains all the parts referred to excepting the swing back, and in making up a camera from the design the position of H will be determined by the focal length of the lens it is intended to use. A camera corresponding in dimensions to the figures given has been used successfully for lenses from 5 inches to 6½ inches. The magazine should be filled with plates, leaving a space of about $\frac{1}{16}$in. unoccupied, and if a smaller number of plates be used than it will contain, a dummy "block" occupying the otherwise vacant space *must* be used. If the vacant space amounts to $\frac{1}{8}$ or $\frac{1}{4}$ inch, plates *cannot* be changed. If plates are slightly larger than ordinary, they may be slow in moving, and it might be necessary to tap the camera to effect the start, but if the work be constantly tested by a plate of the correct size during the making, it is not likely to give much trouble. If it be thought worth while, the exposure chamber at the front may be a trifle ($\frac{1}{16}$in.) larger than at the rear, gradually tapering until about an inch from the front it reaches the right size. If, again, the magazine be $\frac{1}{16}$in. larger at the back than at the front, tapering as above, but this time from back to front, it might be possible to

ensure that a plate always passed from a properly fitting chamber to a larger one, and failure on account of sticking be an impossibility.

It only remains briefly to indicate the order of procedure when out with the camera. First set the shutter, and bring D forward. Second, allow plate to drop from magazine, replacing C. Third, draw D back into position. Fourth, expose. Fifth, return plate to magazine. This order has been adopted for a great while, and with very satisfactory results, whereas when the setting of the shutter was left to the last, occasionally a plate was lost from forgetting to shield the lens during the setting of the shutter. Fig 15 shows the appearance of the original model of the camera here described.



Mr. W. Richardson, of The Ferns, Sea View Road, Liscard, Cheshire, writes:— "The New 'Desideratum' Lens which I purchased from you three weeks ago turns out a capital Lens, with which I am perfectly satisfied. It gives splendid definition, and covers the plate to the edges. You certainly deserve success for introducing such a cheap and good Lens, and have my best thanks and wishes."

SCALE OF CHARGES FOR CASH WITH ORDER.

Rapid Rectilinear..... Focal Length	$6\frac{1}{2}$ x $3\frac{1}{2}$ £1 4 0 $4\frac{3}{4}$in.	$6\frac{1}{2}$ x $4\frac{3}{4}$ £1 13 0 $7\frac{1}{2}$in.	$8\frac{1}{2}$ x $6\frac{1}{2}$ £2 10 0 $10\frac{1}{4}$in.	10 x 8 £3 0 0 $13\frac{3}{4}$in.
Wide-angle Rectilinear ... Focal Length	1 4 0 $3\frac{1}{8}$in.	1 13 0 $4\frac{3}{8}$in.	2 10 0 $6\frac{1}{4}$in.	12 x 10 3 0 0 $7\frac{15}{16}$in.
Portrait, rack adjustment. Focal Length	1 0 0 $4\frac{3}{8}$in.	1 15 0 $6\frac{3}{4}$in.	3 15 0 $10\frac{3}{8}$in	10 x 8 9 15 0 $15\frac{3}{4}$in.
Wide-angle Landscape ... Focal Length	6/6 6in.	9/0 8in	11/0 11in.	15/0 $13\frac{3}{4}$in.

A full detailed list of all Lenses (eight patterns) will be sent free and post paid to anyone who will ask for it.

All Orders must be accompanied by Remittance, which will be refunded if Lens be not approved and returned within six days in good condition. Packing free. Carriage charged. Owing to the delicate nature of Lenses, we can take no risk in transit.

Hockin's Desideratum Lenses

MANUFACTURED BY

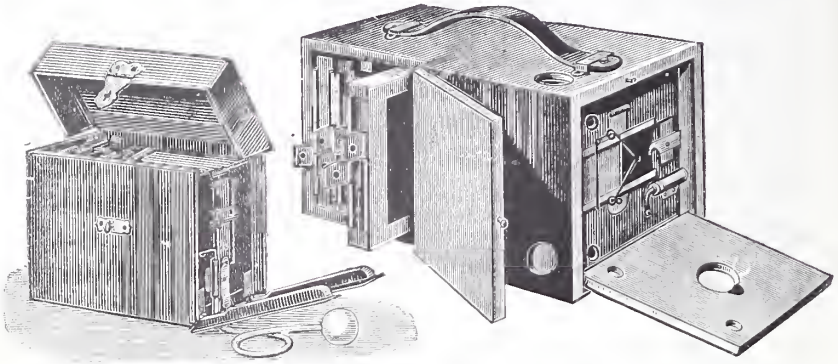
HOCKIN, WILSON & CO.,

NEW INN YARD, 186a, TOTTENHAM COURT ROAD,

LONDON, W.

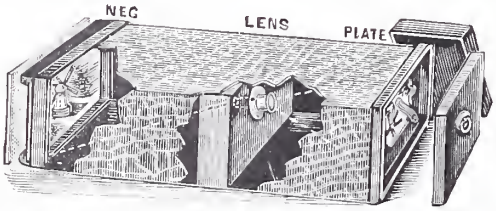
GRIFFITHS'S PATENT

DETECTIVE CAMERAS.



THE GUINEA. THE TWO GUINEA.

LANTERN SLIDE CAMERA



AND ENLARGING CAMERAS.

Catalogue of these and other Cameras and Apparatus post free on application.

☞ **In preparation. SETS OF CAMERA LENS and TRIPOD. Entirely new departure in construction. Particularly suited to the tropics and export generally.**

DEPOT:
5, UNION PASSAGE.

GENERAL PHOTOGRAPHIC MATERIALS, &c.

Works: Highgate Sq., Birmingham.

London Show Rooms and Agency:
THE FRY MANUFACTURING CO., 5, CHANDOS STREET, STRAND.

Wholesale Provincial Agent:
W. TYLAR, 57, HIGH STREET, ASTON, BIRMINGHAM.

SECTION V.

THE LATEST NOVELTIES

IN

PHOTOGRAPHIC APPARATUS,

APPLIANCES AND PROCESSES,

FORMING A CONTINUATION AND BRINGING UP TO DATE OF THE INFORMATION CONTAINED IN THE

PHOTOGRAPHERS' INDISPENSABLE HANDBOOK

AND

"PHOTOGRAPHY" ANNUAL 1891.

COMPILED BY

WALTER D. WELFORD,

Editor of "The Photographic Review of Reviews."



TRADE MARK

Ilford.

IN submitting to you a new edition of our Price List, we desire to call your special attention to several new and important introductions, which make our List of Photographic Plates and Papers more extensive than that of any other manufacturer in the world.

In order to effectually cope with the enormous growth of our business in our old and well-known articles, and to provide room for the output of the new articles, we have built a large additional factory, more than doubling our power of production. Our works are now THE LARGEST IN THE WORLD.

As hitherto, our motto is—"QUALITY IS THE FIRST CONSIDERATION."

The best proof of the absolute superiority of our goods is that **our sales are now larger than those of all other English manufacturers combined.**

The Britannia Works Co.,

LIMITED.

ILFORD PLATES.

ORDINARY SERIES (Yellow Label).

THESE Plates are the standard for everyday work of all grades. They have stood unequalled since 1879 as the most uniformly reliable Plate, and they have the largest sale of any plate in the world.

PRICES.

$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{1}{4}$	$6\frac{1}{2} \times 4\frac{3}{4}$	$7\frac{1}{4} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 4\frac{1}{4}$	$7\frac{1}{2} \times 5$ inches.
1/-	1/7	2/2	2/3	2/10	3/2	3/5 per doz.

8×5	$8\frac{1}{2} \times 6\frac{1}{2}$	$9 \times$	10×8	12×10	15×12 inches.
3/9	4/3	5/-	7/3	10/6	18/- per doz.

ALL OTHER SIZES TO ORDER IN A FEW DAYS.

All our Goods are Guaranteed suitable for all Climates.

RAPID SERIES (White Label).

THESE Plates are 25 per cent. more rapid than the ordinary, and the most perfect for hand camera work. They are recommended for this work by all the best hand camera makers. They are also most extensively used for portrait work where extra speed is desired, and are the **best plates for all-round work.**

PRICES.

$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{1}{4}$	$6\frac{1}{2} \times 4\frac{3}{4}$	$7\frac{1}{4} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 4\frac{1}{4}$	$7\frac{1}{2} \times 5$ inches.
1/3	2 -	2/9	3 -	3/8	4/2	4/6 per doz.

8×5	$8\frac{1}{2} \times 6\frac{1}{2}$	9×7	10×8	12×10	15×12 inches.
4/9	5/6	6/6	9/6	13/-	23/- per doz.

ALL OTHER SIZES TO ORDER IN A FEW DAYS.

All our Goods are Guaranteed suitable for all Climates.

SPECIAL RAPID SERIES (Red Label).

THESE Plates are **the most rapid plates in the market.** They are double the speed of the yellow label. For Portrait work in dull studios, or on dark days, they are an absolute necessity, and for hand camera work under extreme conditions, cannot be beaten, **combining as they do the two extremes of density giving and gradation.** (*See new formula.*)

These plates are specially used by all the best Observatories in the world for astronomical work.

PRICES.

$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{1}{4}$	$6\frac{1}{2} \times 4\frac{3}{4}$	$7\frac{1}{4} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 4\frac{1}{4}$	$7\frac{1}{2} \times 5$ inches
1/6	2/6	3/3	3/8	4/6	5/-	5/3 per doz.

8×5	$8\frac{1}{2} \times 6\frac{1}{2}$	9×7	10×8	12×10	15×12 inches.
6/-	6/6	8/-	10/-	16/-	24/- per doz.

ALL OTHER SIZES TO ORDER IN A FEW DAYS.

All our Goods are Guaranteed suitable for all Climates.

ILFORD PLATES.

Isochromatic (Medium or Instantaneous).

THESE are a new introduction, made UNDER ROYAL LETTERS PATENT (of which we are joint licensees). The attributes of Isochromatic Plates are too well known to need repetition here. The Ilford Plates of this character will have all the good qualities of the ordinary plates, and, for their special purposes, will be unequalled by any other brand. Uniformity, reliability, and good keeping quality will be combined with the advantages of "colour correctness."

Prices.

$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{1}{4}$	$6\frac{1}{2} \times 4\frac{3}{4}$ inches.
1/6	2/6	3/3	3/8 per doz.
$7\frac{1}{4} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 4\frac{1}{4}$	$7\frac{1}{2} \times 5$	$8\frac{1}{2} \times 6\frac{1}{2}$ inches.
4/6	5/-	5/3	6/6 per doz.
9×7	10×8	12×10	12×15 inches.
8/-	10/-	16/-	24/- per doz.

ALL OTHER SIZES TO ORDER IN A FEW DAYS.

ILFORD Isochromatic Screen & Holder.

(Patent applied for.)

The Screens are of a glass specially manufactured for us by an eminent English firm. They are optically worked by one of the largest London lens manufacturers. Every Screen is carefully tested before being sent out, and guaranteed to do its work well.

No. 1 Screen increases exposure 3 times.
No. 2 ,, ,, ,, 6 ,,

Do not use any deeper tint (unless under the advice of an expert), or you will find your colours over-corrected.

The No. 1 Screen is most suitable for landscape work, and the ordinary photographer does not need any other.

The No. 2 Screen is necessary for the worker who goes in for copying, and has some subjects of very strong contrast of colours.

The Ilford Screen Holder has been designed by us, and by its use one Screen is available for any sized lens (up to two inches in diameter). Hitherto a separate screen was necessary for each lens. The frame is always in position, and does not interfere with the ordinary working of the camera when the screen is not wanted. When it is required it is slipped into the holder, and, without further attention, is in position as long as it is required. The lens may be changed or the rising front shifted, but the Screen is still in position.

The Screen and Holder are sent out in a neat Leather-covered Case at a cost of

7/6, post free **7/9.**

Can be had from all Dealers; from W. TYLAR, 57, High Street, Aston, Birmingham, who is manufacturing the Holders for us; or from us direct—

THE BRITANNIA WORKS CO., LTD.,
ILFORD, LONDON.

ILFORD PLATES.

SPECIAL LANTERN PLATES (for Black Tones).

INTRODUCED to the public in the winter of 1890, these plates at once leaped into popularity of a most marked kind. They give slides of unusual brilliancy, clear highlights, and transparent shadows; veiling is entirely absent. They can be used either for Contact or Reduction Printing, and give great latitude of exposure and a considerable range of tone—from cold to warm black.

Price.

3¼in. × 3¼in.—**1/- per dozen.**

ALL OTHER SIZES, AT PRICES OF ORDINARY PLATES, TO ORDER IN A FEW DAYS.

ALPHA LANTERN PLATES (for Warm Tones).

THESE plates are for Contact Printing only, and give slides of any colour, from greenish black, through all shades of brown, red and purple, to bright blue. They are specially suitable for microscopic subjects and others where a variety of colours are desired.

Price.

3¼in. × 3¼in.—**1/- per dozen.**

ALL OTHER SIZES, AT SAME PRICES AS ORDINARY PLATES, TO ORDER IN A FEW DAYS.

ILFORD PAPERS & OPALS.

BROMIDE PAPERS AND OPALS.

IMPORTANT REDUCTION OF PRICES.

THESE Papers and Opals are used throughout the world. They are renowned for beauty and purity of tone, brilliancy of image, transparency of shadows, and for cheapness.

RAPID.—The most sensitive in the market for Enlargements by artificial or daylight.

SLOW.—For daylight Enlargements or Contact Prints.

N.B.—Both rapidities are made with either rough or smooth surfaces as desired.

Owing to the great increase in the demand for the Ilford Bromide Paper, we have laid down an entirely new, improved, and enlarged plant for its production, and having thereby effected a substantial economy in the cost of manufacture, we have decided to give our customers the benefit thereof, and call special attention to the

REDUCED PRICES, AS SHOWN BELOW.

Prices of Bromide Papers of all Qualities.

ROUGH SLOW. ROUGH RAPID. SMOOTH SLOW. SMOOTH RAPID.

PER DOZEN SHEETS.

$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	8×5	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8
6d.	9d.	1/1	1/5	1/11	2/9

$12\frac{1}{2} \times 10\frac{1}{2}$	$15\frac{1}{2} \times 12\frac{1}{2}$
4/-	6/6

PER HALF-DOZEN SHEETS.

18×15	20×16	23×17	$24\frac{1}{2} \times 19$
5/3	5/9	6/9	7/6

Roll 10 ft. $\times$ $24\frac{1}{2}$ ins., 8/6.

All our Goods are Guaranteed suitable for all Climates.

PRICES OF ILFORD BROMIDE OPALS.

	Per half dozen. s.	d.
4¼in. × 3¼in.	2	6
5in. × 4in.	3	3
6½in. × 4¾in.	4	0
8½in. × 6½in.	6	6
10in. × 8in.	8	6
12in. × 10in.	13	0
15in. × 12in.	20	0
20in. × 16in.	34	0
24in. × 18in.	46	0

A piece of Bromide Paper enclosed in each box as a test for exposure.

NOTE.—When ordering Bromide Paper or Opals, please state whether the Rapid or Slow kind is required.

ALPHA PAPER (Rough or Smooth Surface).

This Paper gives Contact Prints, by artificial light, of all shades of warmth. It is the only paper of its kind, and offers special facilities to those who are unable to do their printing by daylight. Development is done with ferrous oxalate or hydroquinone.

Prices of either Rough or Smooth Paper.

	s.	d.	
4¼in. × 3¼in.	0	5	per dozen sheets.
5in. × 4in.	0	8	,, ,,
6½in. × 4¾in.	1	0	,, ,,
8in. × 5in.	1	4	,, ,,
8½in. × 6½in.	1	9	,, ,,
10in. × 8in.	2	6	,, ,,
12in. × 10in.	3	6	,, ,,
Roll, 10ft. long × 24in. wide	7	0	
15in. × 12in.	5	6	,, ,,
20in. × 16in.	5	0	per ½-doz. sheets.
24in. × 19in.	6	6	,, ,,

NO OTHER SIZES PACKED.

All our Goods are Guaranteed suitable for all Climates.

ILFORD PRINTING-OUT PAPER.

PINK OR WHITE.

THIS is a Gelatino-chloride Paper, to be used as a substitute for Albumenised. It has many advantages over the latter. It can be finished with either an ordinary, matt or enamelled surface, or burnished in the ordinary way. Prints can be made either of warm or cold tones. There is a considerable saving in time of both printing and toning; and, lastly, it is

LESS THAN HALF THE PRICE

of any other similar paper. Taking into consideration that the sheets are 10 per cent. larger than Albumenised Paper, that they cut into ordinary photographic sizes with greater economy, and that there are not any water-marked edges, it is the

CHEAPEST PHOTOGRAPHIC PRINTING PAPER IN THE WORLD.

N.B.—SOLD IN SEALED TUBES ONLY.

Prices.

2 Sheets	6 Sheets	12 Sheets	1 Quire
1/9	4/3	7/6	15/-

WITH POSTAGE.

2 Sheets	6 Sheets	12 Sheets	1 Quire
2/-	4/6	8/-	16/-

EACH SHEET MEASURES 24½ by 17 INCHES.

THE ILFORD

MANUAL OF PHOTOGRAPHY.

C. H. BOTHAMLEY, F.C.S., F.I.C.

200 pp. Bound in Cloth. Copious Illustrations.

THE STANDARD HANDBOOK.

Concise, Lucid,
Everything Explained,
Nothing taken for Granted.

Brings the subject within the grasp of every beginner, yet is never too simple for old hands.

PRICE 1/-; post free, 1/3.

FROM ALL DEALERS; OR THE BRITANNIA WORKS CO., LTD., ILFORD, LONDON, E.

ILFORD MONTHLY JOURNAL.

Photographic Scraps.

SENT FREE on receipt of stamped ½d. wrapper.

WILL DEALERS AND SHIPPERS

KINDLY ASK FOR A

MONTHLY SUPPLY

FOR

FREE DISTRIBUTION.

"PHOTOGRAPHIC SCRAPS" IS FULL OF INFORMATION AND PRACTICAL HINTS.

SECTION V.

PHOTOGRAPHIC APPARATUS AND MATERIALS.

Compiled by WALTER D. WELFORD.

Introductory.

In setting forth the novelties and improvements in photographic apparatus and materials, which have appeared since the issue of last year's Annual, I must confess to some surprise at their number and extent. It would be a very natural conclusion that as the 1891 Annual covered the three years intervening between it and the Photographer's Indispensable Handbook, that the present Apparatus Section—which covers only one year—should be much less in number of pages. That it is not so, my readers can readily judge. Nevertheless, as *Photography* and its Editor never do anything by halves, nothing has been omitted on the score of space.

There is one little matter that needs a brief reference. Last year's Apparatus Sections (V. and VI.) were somewhat loudly attacked by rivals, not wholly disinterested, on the score that they were mere trade catalogues. The whole secret of this impression lay in the fact of our quoting prices. But our object in these sections is to give all the information possible to purchasers of the work, and certainly the cost of an article is to many, perhaps, the principal item, and to all an interesting one. The readers and users of the Annual have to be pleased, not our critics and competitors. That the inclusion of the prices is a useful feature for them, and a convenient reference, I have received ample proof.

In its general lines the present Section differs but little from its predecessor. In fact, especial care has been taken to keep it as uniform as possible with that of 1891. The parts and divisions are the same, and the only change is the inclusion of complete sets of apparatus, which is done to meet the wishes of many who last year regretted the omission of that portion of the Photographer's Indispensable Handbook.

Change and Progress.

Hand cameras, in the natural order of things, have appeared in battalions, although there is but little change to report in stand cameras, exeept the more widely prevailing use of the metal aluminium for the fittings.

In lenses there are two very great advances, the Tele-photo and the new Coneentric. The former may not be absolutely new, but the power of long distanee photography is now praetieally and commereially an aecomplished faet. The new Coneentrie lens is stated by the best authorities to be the greatest improvement in lens eonstruction for many years.

Magnesium flash lamps have also reeeived mueh attention in the direction of continuous aetion, and in this conneetion Mr. Humphrey's new light is a great step in advanee.

Films are eoming to the front, and a deal of attention is being given to roll holders, film earriers and film slides, from whieh the photographer will derive eonsiderable benefit.

In materials, the progress of the year is undoubtedly in the direetion of printing-out emulsion papers. Isoehromatic plates, too, have been mueh reduced in priee.

One new developing agent has appeared, viz., "Rodinal," and the new enlarging solution, "Cresco-Fylma," has attraeted some attention.

With these few remarks I lay aside the pen that has been in eonstant use since last Deeember, trusting the result of its work may be of interest and utility to the still inereasing army of photographers.

WALTER D WELFORD.

Birmingham, May 1st, 1892.



RECKONING IT OUT

Half-tone Engraving by the Crosscup & West Engraving Co., **Philadelphia, U.S.A.**

PART I.

CAMERAS.

DINARY CAMERAS. HAND CAMERAS. SPECIAL CAMERAS.
APPARATUS CONNECTED WITH CAMERAS.

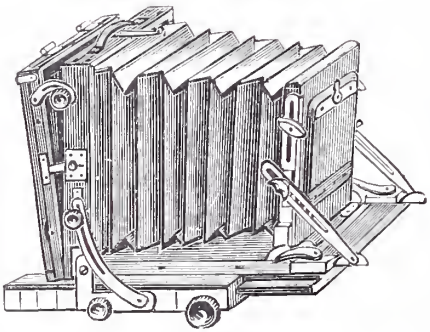
ORDINARY CAMERAS.

The following were noticed in the "Photographers' Indispensable Handbook":—

Amateur ... ...Mawson
Appleton's 1887 ...Appleton
Ashford's Patent...Ashford
Best Pocket ...Dale
,, ...Elliott
Best Tourist ... ,,
,, ...Robinson
,, ...Sands
Bicyclist ... ...Newton
Britannia ... ...Marion
Brown's ... ...Shew
Charterhouse ...P.A.S.A.
,, Universal ... ,,
Cheap ... ...Fallowfield
,, ...Mawson
,, ...Marion
Cheap Pocket ...Collins
,, ...Dale
,, ...Elliott
Cheap Tourist ...Sands
Combination ...Marion
Compacta ... ,,
Compactum ...Fallowfield
,, ...Underwood
Continental ...Shew
Crouch's ... ...Crouch
Double Extension Hulme
,, ...Tylar
Double Patent ...Sands
Double Pinion ...McKellen
Engineer ... ...Stanley
Exhibition ...Sands
,, ...Underwood
Expanding Back . Collins
Extra Portable ...Stanley
Folding ... ...Fallowfield
,, ...Elliott
Humphrey's ...P.S. & R.
Imperial .. ...Sands
Improved Cheap...Collins
,, Long Focus Houghton
Impvd. Lng. Focus Platt
,, ,, Shew
,, ,, Wratten
,, Ludgate Dale
,, Pocket...Mawson
,, Portable Hare
,, Tourist...Mason
,, ,, ...Wratten
Instanto ... ...Marlow
,, ...Underwood
Instantograph ...Lancaster
,, 1887 ,,
International ... ,,
Kinnear Pattern ...Hare
,, ...Wood
Ladies ... ...Lancaster
Landscape... ...Thomas
Lantern Slide ...Shew
Light Tourist ...Watson
Liverpool ... ...Newton
Long Extension ...Mayne
Long Focus ...Crouch
,, ...Marion
,, ...Mawson
,, ...Robinson
,, ...Stanley
,, ...Wood
,, ...Wright
Medical ... ...Newton
Meritoire ... ...Lancaster
Merveilleux ... ,,
Middleness ...Marion
Model Tourist ...Shew
New Extension ...Marlow
New Folding ...Meagher
No. 2 ... ...Tylar
Ordinary Tourist.. P.A.S.A.
Optimus Folding...P.S. & R.
,, Long Focus ,,
,, Tourist ... ,,
Pall Mall ... ...Thomas
,, L.F. ... ,,
Patent Extension ..L. S. Co.
Perfect ... ...Fallowfield
Perfection ... ...Underwood
Plain Sliding ...
Plain Bellows ...P.A.S.A.
Pocket ... ...Fallowfield
,, ...Hare
,, ...Shew
,, ...Stanley
,, Ebonite ...Mayfield
Polytechnic ...Robinson
Portable .. ...Collins
,, ...Mason
,, ...Hare
,, ...Stanley
,, ...Shew
,, Wood ...Stanley
Premier ... ...Watson
Rambler ... ...Platt
Rayment ... ...P.S. & R.
Repeating Back ...
Sciopticon ...Sciopticon
Square Folding ...Watson
Small Tourist ... ,,
Smith's Patent ...Smith
Smith's Landscape P.A.S.A.
Special ... ...Fallowfield
Special Ludgate ...Dale
,, 1886 ...Lancaster
,, 1887 ... ,,
Stratford ... ...Bleasdale
Studio and Field ..Shew
Thomas's Original Thomas
Thornton's ...Thornton
Tourist ... .. Marlow
,, ...Mason
,, ...Newton
Tourograph ...Underwood
,, 1887 ... ,,
Universal ... .. Atkinson
,, Tourist...Wood
Victoria ... ...Park

The following were noticed in "Photography Annual," 1891.

1890	...Shew	Garrick Tourist	Griffin	Phœnix ...	...Reynolds
1890 Special	...Fallowfield	Gordon ...	.. Skinner	Popular ...	Crouch
1890 „ No. 2	... „	Gresham ...	.. Sharp	Popular ...	Middlemiss
Acme	...Watson	Griffin L. F.	...Griffin	Portable ...	...Robinson
Balancing	...Thomson	„ Square ...	„	Portable A.R.	...P. S. & R.
Challenge L F.	.. Adams	Instantograph 1891	Lancaster	Ravleigh ...	...Skinner
„ S.F. ...	„	„ B.B.	„	Ross, No. 1	...
Challenge	...Swift	International ...	„	„ „ 2	...
Cheap	.. Elliott	Invincible Metal...	„	„ „ 3	...
Cheap Amateur	...Schölzig	Ladies ...	. Mitchell	Ruby ...	...Thornton
Circumbra	...Pearson	Loidis ...	.. Pearson	Safety Kinnen	. Reynolds
Club	.. Adams	Long Focus	.. Slater	Samuels ...	...Marion
Collapsible	.. Pearson	Long Focus	.. Swift	Scorer's Patent	
Collapsible	...Wratten	Medium ...	. Shew	Scotia ...	...Thomson
Criterion	.. Middlemiss	Meritoire, 1891	.. Lancaster	Serviceable	...Preston
Cyclone	.. Marion	Merveilleux, 1891	.. „	Simple ...	.. Shew
Double Exten.	.. Park	New Model	.. Skinner	Special, 1891	.. Lancaster
Double Exten.	...Vevers	Noakes	.. „	Special ...	...Elliott
Drayton	...Humphries	Optimus Studio	.. P. S. & R.	Speciality ...	... „
Eclipse	...Atkinson	„ W. A.	.. „	Stanley ...	.. Riley
Extra Portable	...Stanley	Original Special.	Fallowfield	St. John ...	.. Lund
Extra Special 1891	Lancaster	Parallel Bellows.	Vevers	Studio Universal	Lancaster
Faultless	.. Fa lowfield	Pecrops ...	. Beck	Tourist ...	...Humphries
Featherweight	...Gotz	Perfect ...	...Fallowfield	Tourist ...	...Skinner
Garrick Light	...Griffin	Perfection...	. Marion		
„ Special 1891	„	„ ...	.. Vevers		



No. 1.

1.—**The "King"** (London and Paris Optic Company).

Details.—Conical leather bellows, double extension, swing, rising, and cross fronts, rack focussing, front drawn out and clamped at any point, back can be brought up to the front or *vice-versa* for short focus work, swing back, from the centre.

Remarks.—The special features of this excellent camera are, that the arrangement of brass forks in front gives room for a larger front than usual and also for a cross movement front, and the centre swing of the back. The latter, too, does not add so much to the bulk as might be thought. The workmanship is throughout excellent, the fancy stamping all over the brasswork adding also considerably to a handsome appearance. I must not forget to mention that the dark slide is fixed automatically in the reversing back by a spring catch, so that there is no chance of pulling out the slide in opening the shutter.

Prices, with one double back fitted with spring catch:—

½ pl.	¼ pl.	12 × 10
£8 0 0	£9 17 6	£15 0 0

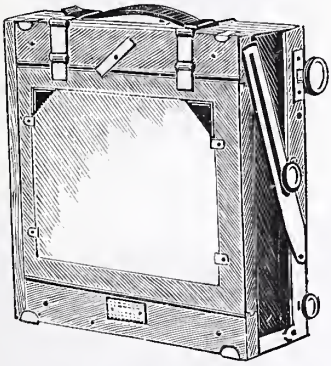
2.—**The "Invicta" W.A.** (Noakes & Son).

Details.—A double extension pattern, in which the use of either long or short focus lenses is arranged for. The back has a special arrangement so that it can be moved right up to the front. The back and front have each a double swing movement, and a side swing as well. In addition, the front rises and falls as required. A feature, too, is, that in setting up, the back and front respectively fall automatically into the correct and vertical positions.

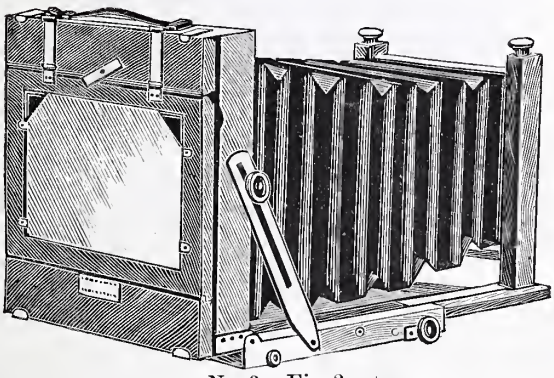
Remarks.—Considering the movements provided, the prices are moderate. The camera is well-made throughout.

Prices, which include three double backs—

½ pl.	¼ pl.	12 × 10
£7 7 0	£10 10 0	£15 0 0



No. 3. Fig 1.



No. 3. Fig. 2.

3.—**Slater's Long Focus** (W. F. Slater).

Details.—A double extension of the usual pattern. Leather bellows, rack and pinion focussing, reversing and swing back, rising front.

Remarks.—A recent introduction of Mr. Slater's to supply a camera possessing several points that are often demanded, at a very low price.

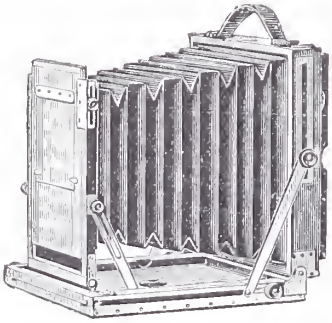
Prices include three double book form dark slides.

½ pl.	¼ pl.	10 × 8	12 × 10	15 × 12
£4 0 0	£5 10 0	£7 10 0	£9 10 0	£11 10 0

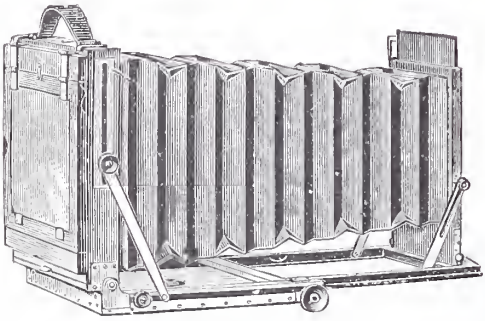
4.—**Marion's New.**

Details.—This is really a special camera forming one of their well-known outfit series. It can be used for long or short focus work and is, generally, of the usual type. Its attractive feature is the price, which is certainly moderate. It is only issued in one size, viz., half-plate.

Price, including the double back and tripod stand, £3 15 0.



No. 5. Fig. 1.



No. 5. Fig. 2.

5.—**Ashford's Improved** (J. Ashford).

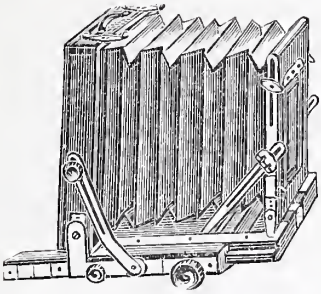
Details.—As with other makers, Mr. Ashford has improved and altered his pattern during 1891. The rising front works independently of the bellows, so that the latter remains parallel always. The front is capable of being raised as high as in an ordinary parallel bellows camera, and can be used to its fullest extent at its shortest focus without cutting off any part of the plate. The back slides up to the front when using wide-angle lenses, there is, therefore, no projecting baseboard to cut off the angle of view. It has reversing frame, hinged focussing screen, vertical and horizontal swing back and leather bellows.

Remarks.—It is certainly a well finished, light, strong and rigid camera, with no loose parts; easily and quickly set up, giving a long and short focus, and closing into a very small compass A feature of the sliding movement for the back is that it moves in brass, and not in wood, which is apt to cause sticking at times.

Prices, with three double backs—

¼ pl.	½ pl.	¼ pl.
£4 10 0	£6 10 0	£8 10 0

Extras.—Automatic catches to slide shutters 2s. each



No. 6.

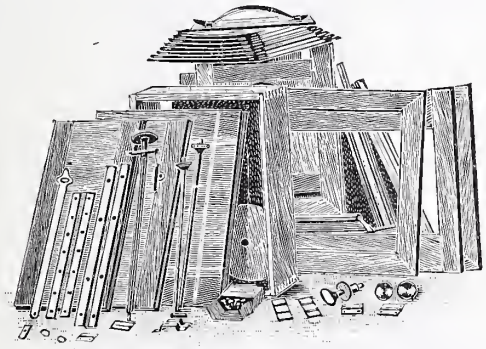
6.—**"The Baron"** (London & Paris Optic Co.)

Details.—Swing front and back, rising and falling front, body sliding forward for wide-angle lens, rack and pinion adjustment. Long focus conical bellows, made square, with reversible holder and fitted with patent brass fork with extra large front. Dark slides lock in camera with special automatic spring.

Remarks.—In construction this pattern is very like No. 1, the principal difference being the omission of the centre swing back. It is consequently cheaper, and less bulky. The finish and appearance, however, is quite equal.

Prices, with one double back (spring catch)—

½ pl.	¼ pl.	12 × 10
£6 15 0	£8 7 6	£12 0 0



No. 7.

7.—**The "Northern"** (Lonsdale Bros.)

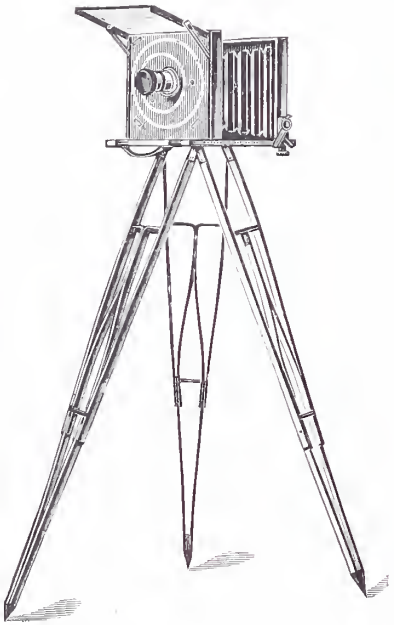
Details.—Briefly put, this camera is issued "in bits," ready for the amateur to place together. I could not very well include it under "Special Cameras," because that term applies to the object of use, whereas with the present one the difference lies with the construction of it. The illustration represents the various fittings and woodwork necessary for the completion of the camera and one double dark slide, and includes the various brass fittings, rack and pinion, focus screen, leather bellows, handle, slide partition, and the screws required for putting together and fitting up. The woodwork is just sufficiently advanced for the amateur to finish with the usual hand tools. The operations best performed with more elaborate machinery and steam-power being already done, *i.e.*, the baseboard

clamped and ploughed for racks and pinion; the body dovetailed; the bellows frame, focus screen frame, extending frame and reversing back mitred, keyed and glued up; the front turned out for circular disc; and the slide shutters rabbeted and clamped.

Remarks.—For those with a hankering after amateur camera making, this camera, or, rather, these "bits," should commend itself or themselves. It will afford pleasurable evening occupation, and the owner can afterwards point to it with pride as put together by himself. The materials are good, and though I have not myself taken the job on (N.B.—I shouldn't like to use the camera if I did, being no sort of a hand with tools) it should certainly commend itself to others more skilful, and with more time at their disposal than I possess.

Prices.—With brass-work unfinished (excepting milled screws and pinion, which are sent out finished), ½ pl, 35/-

With brass work finished and lacquered and bellows varnished, ½ pl., 40/-



No. 8. Fig. 1.

8.—**Scorer's Patent** (W. Scorer).

Details.—This camera (No. 37, page 260, Phot. An., 1891) has been greatly improved in some of the minor details.

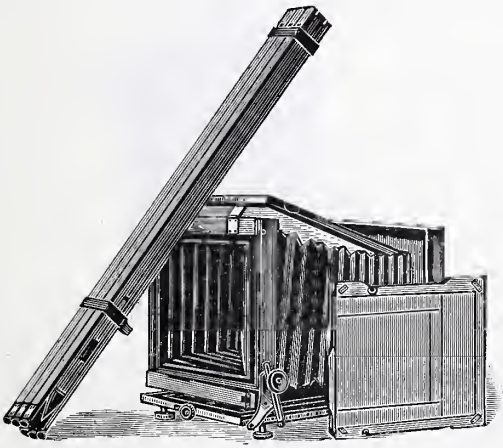
The parallel form of bellows camera is made more compact, the bellows is now made slightly taper, retaining all the points of the old form of bellows, combined with the advantages of a sky shade and extra portability when folded.

The skeleton frame-work, shown in fig. 1, extended over the front of the camera, is rendered an effective sky shade by merely hooking the focussing cloth to three hooks on the light brass bar, which can be elevated or depressed to any angle, and when not required folds up conveniently by the side of the camera front just inside the frame, quite flush with the

front without removing any parts. It is always ready when wanted, and is a most useful addition, making it possible to take a picture with the sun shining in front of the camera, but of course just out of the picture.

This shade is also fitted to the Kinnear bellows camera, which resembles this in arrangement, but is lighter and more compact in form. The illustration also shows the new tripod stand which will be found described later on in its proper section, where this same camera is shown closed on the stand.

There is also an improvement of simple construction, not described in last year's ANNUAL, in connection with the reversing back and its dark slide, the object being to render the slide, when in the camera back, perfectly secure from the admission of light after the withdrawal of the slide covering the plate. This is managed by having the slide so made that it pushes hard up against a thin trap plate fixed to the camera frame on the left-hand side and bottom, which forms a continuous stop for the slide. This effectually excludes all light which might otherwise be admitted through the imperfect contact of the camera back and dark slide frame. At the side of the reversing-back frame at which the shutter is withdrawn, there is fitted a very thin spring fly-up shutter, which is hinged to the velvet insertion in the reversing back. When the dark slide or film-holder is out of the back this shutter stands at about right angles to this back, but when the slide is inserted in its place, lays down on the slide without any trouble; it does not scratch the slide, being covered with velvet. When the dark slide shutter is fully withdrawn from the slide and folded back, this shutter flies up again at right angles to the reversing back the same as before the insertion of the slide covering the joints, which might otherwise admit light. These joints, in the ordinary construction of camera, render it necessary to cover it with the focussing cloth, and even then light is apt to find its way to the sensitive surface of the plate or film. The bolt for holding the slide in its place is let into the reversing back on the right-hand side at the bottom, when the back is in position, for a horizontal picture, and can be seen in fig. 2; also the fly-up shutter.



No. 8. Fig. 2.

The bolt can be worked by one hand, the usual spring being found to require both hands to remove the slide, whereas this can be manipulated with one only, leaving the other free to hold the camera steady.

The improved slide, in form resembles the ordinary book slide, opening as usual at the bottom, but two improvements have been introduced which

makes it equal to the solid slide in its non-liability to admit light at the joints—it cannot come accidentally open. The slide is seen in fig. 2, as also the folded legs of the tripod.

The slide is also perfectly secure from the intrusion of those meddlesome individuals who sometimes take advantage, when the photographer's back is turned, to take a look at the exposed plate.

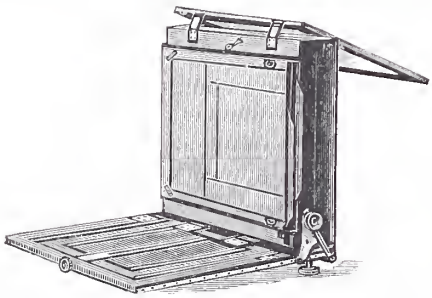
The improvements also prevent any chance of spoiling the plate through the slide coming open when being carried, it also prevents the wrong covering slide being withdrawn, when in the camera, by the operator.

The covering slides to these double dark slides are kept in place by a concealed spring catch, which cannot be released by the fingers or thumb in the ordinary way.

The bolt in the reversing back, when the dark slide is in place, releases this covering slide, the catch being withdrawn from a notch in which it locks.

It is also impossible to withdraw the slide from the back of the camera, unless this bolt is pushed down again, when the plate is covered after exposure.

The two halves of the dark slide are held together by two or more screws which act quickly, these screws are so arranged that they cannot come away from the slide when unscrewed. It does not take a minute longer than usual to fill or empty the slides, the turnscrew or key for opening them can be hung on a nail in the dark-room or attached to an ordinary bunch of keys; if lost or mislaid and no screwdriver is available, they can be loosened with a knife blade or the small end of a lens stop. Being an innovation on the old-fashioned, clumsy-looking clip, which is nearly always coming undone or sticking so tight as to be hard to open, some have thought this new fastening would be much more trouble, for such the old form can still be fitted. These persons, however, would prefer a house without a lock or bolt, would leave their cases unlocked just because it is too much trouble to take care of a key. This improved slide is practically locked by means of the screws, an ordinary 2d. screw-driver will open it—a not very unpickable lock, but quite sufficient for the purpose.



No. 8. Fig. 3.

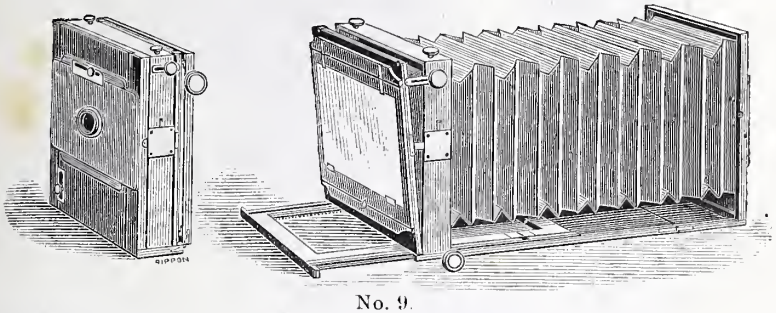
Fig. 3 shows the arrangements of the top of the baseboard of the camera and shows the guides to which the front is clamped, the centre bar is the one to which the focussing screw nut is fixed which enables the camera to be rapidly extended without using the screw; the hooks and guides on top of the base are also shown, which replaces the bar across the frame previously used. The front can now be moved up to the back or the back up to front, a side swing can be had both back and front, plenty of swing always can be given to the back. The camera is opened and closed without removing any screws; the focussing glass is protected by the solid base, which is now cut away, as illustrated in last year's ANNUAL, unless so ordered.

Prices, including patent tripod, rack, turntable, sky shade, &c.—

½ pl.	¼ pl.	12 × 10	15 × 12
£6 10 0	£8 8 0	£12 12 0	£15 15 0

Without turntable and stand, a cheaper make—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£2 15 0	£3 10 0	£5 15 0	£8 10 0	£10 10 0



No. 9.

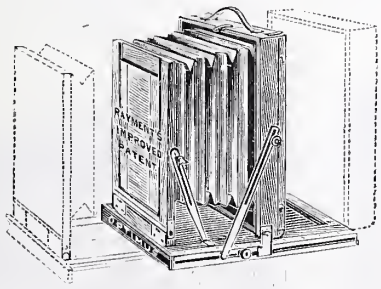
9.—The "Honduras" Exhibition.

Details.—This pattern has been before the public for some time. The changes for 1892 are, that it is now made in "Honduras" mahogany, and the prices are reduced. Double swing back, reversing back, rack focussing, parallel bellows, double extension.

Prices, including three double backs—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£5 0 0	£6 10 0	£7 10 0	£10 10 0	£16 16 0

Extras.—Spring catches to slides, 2s. each slide.



No. 10.

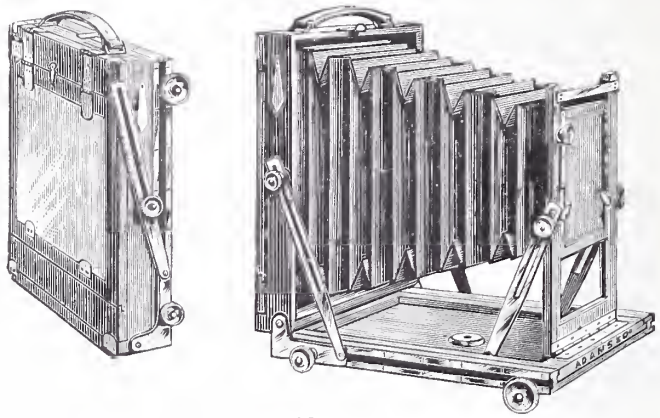
10.—Rayment's Improved 1891 (Perken, Son & Rayment

Details.—See Phot. An., 1891, page 251. The pinion may now be disengaged from the rack, which greatly quickens opening and closing when focussing. The most important feature is the novel and convenient mode of attaching the front lens board to the baseboard. This is done instantly. A hollow ear on each side of the front lens board projects downwards, these fit over spring bolts projecting on either side from a block on baseboard. The bolts spring into the hollow ears forming a safe connection. This is made rigid by the clamping screw of side strut, and the two combine to give any degree of swing that can be needed.

Remarks.—These improvements add greatly to the convenience of use.

Prices, including three double backs—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£6 10 0	£7 5 0	£8 8 0	£10 12 0	£15 14 0



No. 11.

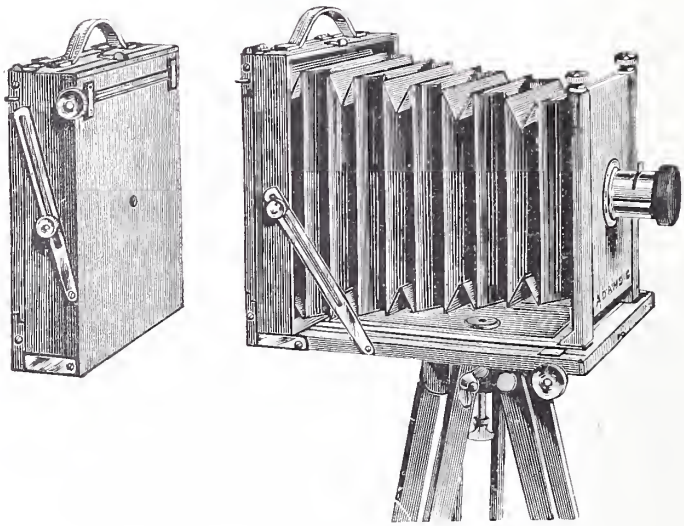
11.—**The "Royal"** (Adams & Co.)

Details.—Square, with reversing and swing back, also rising, falling, and swing front. The back portion slides in grooves up towards the front, thus enabling lenses of the widest angle to be used without the view being cut off by a projecting baseboard, which is frequently the case with cameras of this form. It has plumb indicator on the back, and is of long focus.

Remarks.—As regards movements and general lines of construction, this camera is exactly the same as the "Club" (page 270, Phot. An., 1891), but it is not quite so light, and is cheaper.

Prices, including three double backs, turntable, and tripod—

½ pl.	¼ pl.
£7 10 0	£9 0 0



No. 12.

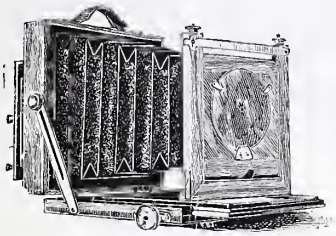
12.—**"The Victor"** (Adams & Co.)

Details.—Double extension, swing and reversing back, rising front, conical leather bellows, rack and pinion focussing.

Remarks.—This is really a special camera for a set comprising in addition a threefold tourist tripod and a lens. It is excellent value throughout for the money.

Prices, camera alone, with one dark slide—

½ pl.	¼ pl.
£3 10 0	£4 10 0



No. 13.

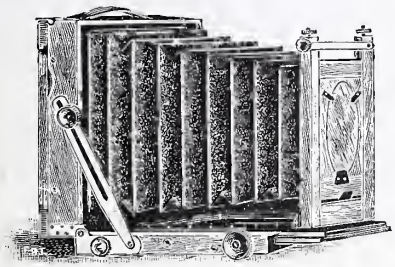
13.—**The Airedale** (Watkinson & Co)

Details.—Double extension. Rack and pinion focussing. Good quality leather bellows. Swing and reversing back. Rising front. Made in two sizes only.

Remarks.—Very good value indeed.

Prices, with one double back—

½ pl.	¼ pl.
£2 17 6	£3 17 6



No. 14.

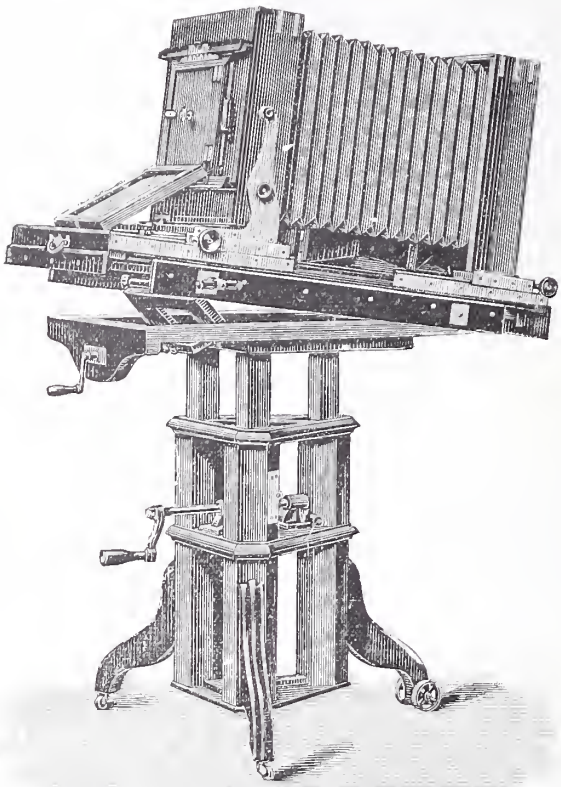
14.—**The "Popular"** (Watkinson & Co.)

Details.—Superior both in finish and convenience to No. 13, though much on the same lines. It, however, possesses the advantage of convenience in use with wide-angle lenses. Double extension. Reversing and swing back. Rising front. Leather bellows. Rack and pinion focussing.

Prices, including three double backs with spring catches—

¼ pl.	½ pl.	¼ pl.	12 × 10
£3 10 0	£4 4 0	£5 5 0	£9 10 0

Extras.—Turntable and three-fold stand, 25s



No. 15.

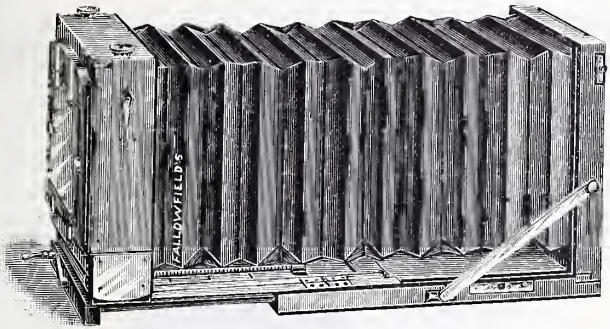
15.—**Studio Camera and Stand** (F. K. Hurman & Co.)

Details.—This is intended for large direct work, and yet possesses the advantage of a repeating back for two cartes or two cabinets upon one plate. The camera is, of course, of mahogany, bellows body, possessing double swing back. Back and front are each movable with rack and pinions, and work independently of each other. By a patented arrangement the bellows never sags, and is always in place at any position. With the double extension copying can be done. There are three dark slides: a large one for taking direct pictures either way, fitted with Venetian roller shutter, and two smaller ones with repeating fittings for producing two C.-de-V. or two cabinets on one plate.

Remarks.—Two points present themselves—an exceedingly handsome appearance, and a very convenient and useful apparatus.

Prices, including special stand—

12 × 10	15 × 12	20 × 16	24 × 20
£25 10 0	£27 10 0	£35 0 0	£50 0 0



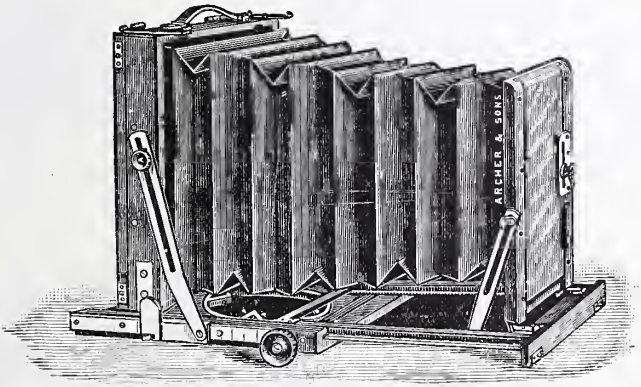
No. 16.

16.—**The New "Perfect"** (J. Fallowfield).

Details.—See Phot. An., 1891, page 243. There are several minor improvements, but none that call for special remark. The advantages of a rigid fixed front, the extension taking place at the back, are too obvious to need reference.

Prices, including one double back—

		Focal Length.	Weight with 1 Slide
½ plate	£6 6 0	16 in.	8½ lbs.
1/1	7 13 0	22 ,,	11½ ,,
12 × 10	10 2 0	32 ,,	20 ,,
15 × 12	12 16 0	38 ,,	25 ,,



No. 17.

17.—**The "Liver"** (Archer & Sons).

Details.—Double extension, double swing to both back and front, extra large rising front, bellows tapers only slightly, reversing back, rack and pinion focussing.

Remarks.—The improvements for this season render this camera quite "up to date." The most novel feature is the clamping of the back of the camera to any part of the baseboard (for the use of lenses of various foci) instantly and easily by simply pressing the catch along the sides. The catch being in the form of a wedge secures it firmly, and at any desired

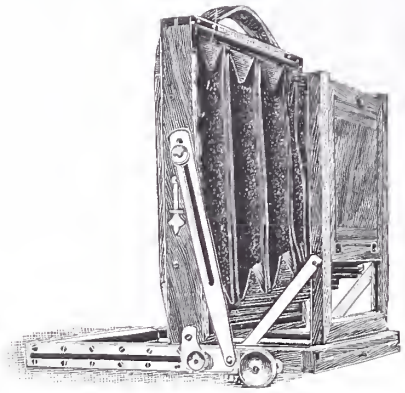
distance from the front. It can also be instantly released again, and there is nothing to get out of its place or be lost. I notice that the partition in the dark slide is hinged, which is a convenience, and that the shutters have flat brass ends.

Prices, which include three double slides—

¼ pl.	½ pl.	¼ pl.	12 × 10
£5 15 0	£6 15 0	£8 10 0	£12 0 0

Extras—Brass turntable, 6/-, 7/6, 10/-, and 15/-

Three-fold stand to fit, 15/-, 17/6, 20/-, and 25/-



No. 18.

18.—**The "Minim"** (Watkinson & Co.)

Details.—A light tourist pattern, with all movements. Double extension, the best leather bellows, reversing and swing back, automatic springs which keep the dark slide in position, levelling plummet, rising front, rack and pinion focussing. The back can be moved up to the front for short focus work.

Remarks.—A very fine instrument, at a moderate price.

Prices, including three double backs with spring catches—

¼ pl.	½ pl.	¼ pl.
£5 10 0	£6 6 0	£7 10 0

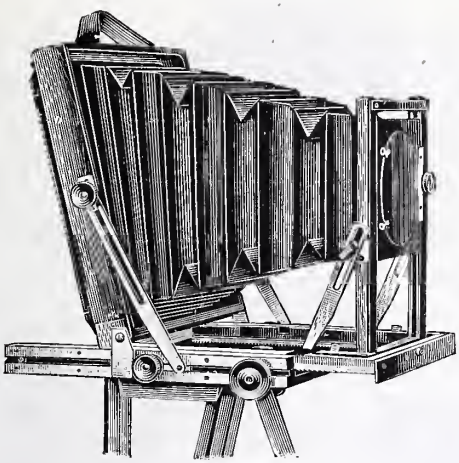
19.—**The "Airedale," in Parts** (Watkinson & Co.)

Details.—This firm also make a speciality of selling a camera in parts, ready for fitting together. It is sent out in such a state of finish that any amateur could, with the knowledge of a camera, easily complete. The woodwork consists of body ready dove-tailed, base board, clamped and ploughed ready for rack and pinion, bellows frame, reversing frame, ground glass frame, and extension frame, all mitred, keyed, and glued, slide rails, front with circular cut ready for lens, double grooving for one slide and two shutters, clamped and rabbeted. The brass work consists of rack and pinion, side struts, milled screws, double hinges, ground glass clips, reversing clips, base board hinges, front bar, hook, turn buttons, extension rods, and guide strips. Sundries consist of leather bellows, handle and bridges, ground glass, zinc partition with spring, side clips and hinges—in fact, everything required, even to wood and brass screws, for completing a camera, and one slide.

Prices.—Woodwork, with flat brass work only, unfinished, but all turned work finished, ½ plate, 35s.

With all brass work highly finished and lacquered, 40s.

With finished and lacquered brass work, and one double slide finished completely, in fact, ready for use, though not polished, £2 5s.



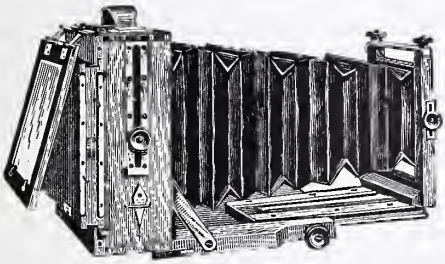
No. 20.

20.—**The "Collapsible"** (Pearson & Denham).

Details.—Double extension, conical bellows, rack focussing, rising and swing front, swing and reversing back. Spring catch for locking dark slide in the camera. The front, when pulled out, is pushed along a groove and fixes automatically, being held by a spring catch at each side. The extension for the half-plate size I find is 14 inches, and the measurements are, allowing for projecting screws, $9\frac{1}{4} \times 8\frac{1}{2} \times 2\frac{1}{2}$.

Remarks.—Very light and yet rigid. The stuff is good and well worked.

Price, with three double slides, ½-pl., £6.



No. 21.

21.—**The "Speciality" No. 2** (Pearson & Denham).

Details.—Double extension, conical bellows, rising front, swing and reversing back, spring catch to lock dark slide. The front is clamped by the usual two rods and nuts from the top. Rack focussing. The extension for a ½-plate is 15 inches. The dimensions closed are, allowing for screws, $9 \times 8\frac{1}{4} \times 3$ inches.

Remarks.—A very well-made instrument at a low price.

Price, including three double backs, ½-pl., £3 15s.

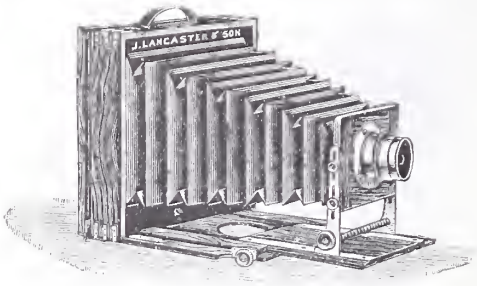


Fig. 1.

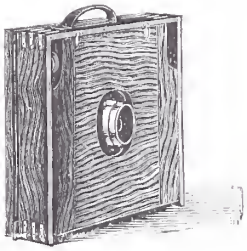


Fig. 2.



Fig. 3.

No. 22

22.—**The 1892 Pocket Instantograph** (Lancaster & Son).

Details.—By excessive neatness in design and construction, and by the use of aluminium fittings, this camera is really a marvel of lightness. Aluminium is used extensively, the runners, front stage, binding pieces, uprights, and supports are all in that metal. The lens, too, is thus mounted; the dark slides are bound, and even the shutter is constructed of it. As an instance of lightness, the ¼-pl. dark slide weighs two ounces only.

Prices, including three double backs, lens, stand, shutter, and case—

¼ pl.	½ pl.	¼ pl.
£4 4 0	£7 7 0	£10 0 0

23.—**The "Aerial"** (W. B. Whittingham & Co.)

Details.—Double extension, conical leather bellows, reversing and swing back, swing and rising front, rack focussing. Back can be moved up to the front for short-focus work (see fig. 2), as also the front to the back.

Remarks.—This camera is a genuine endeavour to combine extreme portability with rigidity, and a successful one. Especially is it light if aluminium fittings be used.

Prices, including three double dark slides—

½ pl.	¼ pl.	12 10	15 × 12
£8 10 9	£10 12 6	£15 2 6	£19 10 0

Extras.—Aluminium fittings, 25%. Turntable and best quality tripod, 33s. 6d., 37s. 6d., 45s., 52s. 6d.



Negative by W. J. Jenkins, Gloucester.

MISS MISCHIEF.

Silver Medal Picture in "PHOTOGRAPHY" Portrait Competition, 1891

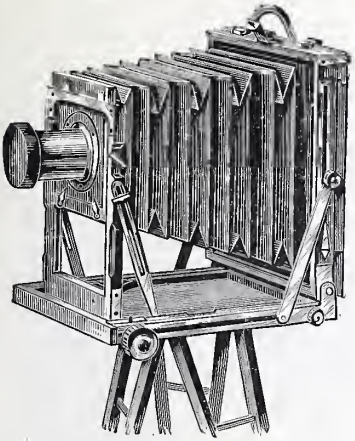
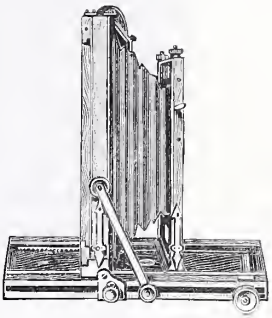


Fig. 1.



No. 23. Fig. 2.

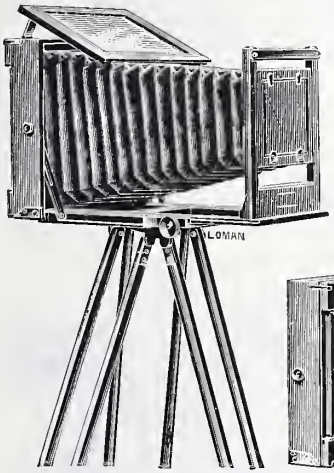


Fig. 1.

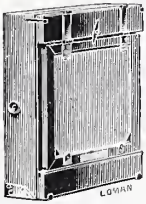


Fig. 2

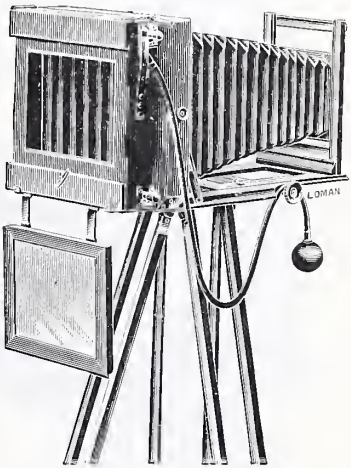


Fig. 3.

No. 24.

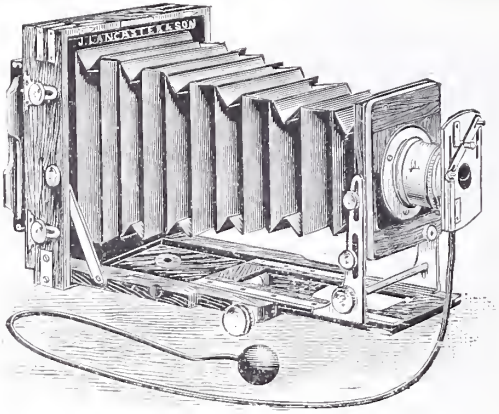
24.—**The "Holland"** (Loman & Co.)

Details.—Double extension, swing and reversing back, rising front, conical leather bellows, rack and pinion focussing. The ½-plate size measures when closed $8\frac{1}{2} \times 8\frac{1}{2} \times 2\frac{1}{16}$, and weighs 3lbs. It has an extension of 16 inches. Possibly the greatest attraction of this camera is that the firm manufacture a roller blind shutter, working directly in front of the plate. The arrangement of this will be seen in fig. 3. It adds but little to the bulk and weight. For further details of the shutter see Part V., "Shutters."

Prices, which include three double backs—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£4 11 8	£5 8 4	£7 10 0	£10 16 8	£13 6 8

Extras.—Shutter including fitting, 25s., 33s. 4d., 50s., 58s. 4d., £5.



No. 25.

25.—**The 1892 Aluminium Instantograph** (Lancaster & Son).

Details.—This is the now well-known instrument, with the various parts in aluminium, reducing the weight considerably.

Prices, including one double slide, lens, shutter, and stand—

¼ pl.	½ pl.	¼ pl.
£3 3 0	£5 10 0	£8 0 0

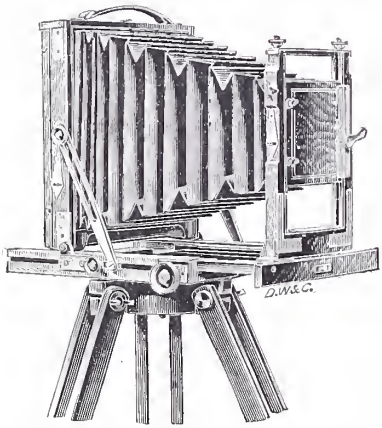


Fig. 1.

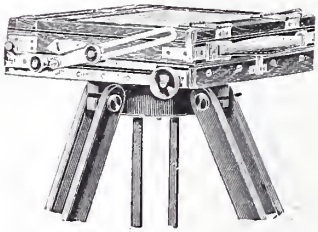


Fig. 2.

No. 26.

26.—**The "Holborn" Special** (Houghton & Son).

Details.—Spanish mahogany, best leather bellows. The latest improvements are embodied—rise and fall fronts, reversing back, double swing back, plummets to the back and front, &c. A special feature with this series is that the back of camera can be pushed forward to within a few inches of the front, so that very short focus lenses can be used. A half-plate camera weighs 4lbs., and measures 9 × 9 × 2½in., and with its three slides 9 × 9 × 4¾in.

Remarks—The series will be found to compete favourably with any other in size, weight, workmanship, and price.

Prices, including three double book form slides, with spring catches—

		With turntable and tripod.
½-plate	£9 0 0	£10 17 6
¾-plate	11 0 0	13 0 0
12 × 10	15 15 0	18 0 0
15 × 12	19 10 0	22 0 0

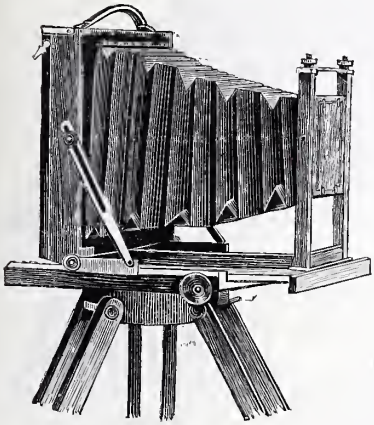


Fig. 1. No. 27.

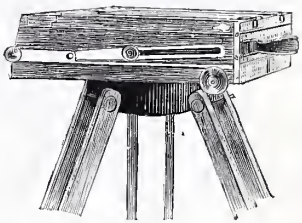


Fig. 2.

27.—**The "Holborn"** (Houghton & Son).

Details.—Really a cheaper pattern of No. 26. The above blocks give some idea of the style, and also show the back pushed forward for use with short focus lenses.

Remarks.—Although the prices are low, the camera is well finished in every respect, and has the latest improvements.

Prices, which include three best double backs—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£4 0 0	£4 15 0	£7 10 0	£12 0 0	£14 0 0

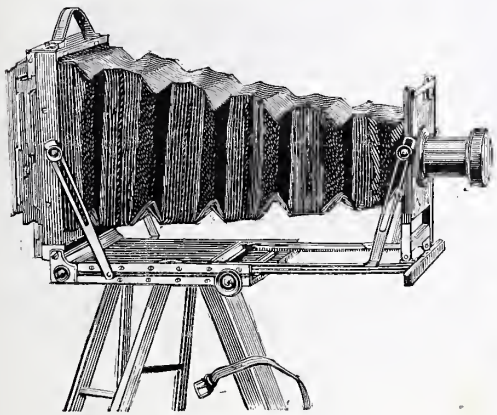


Fig. 1. No. 28.

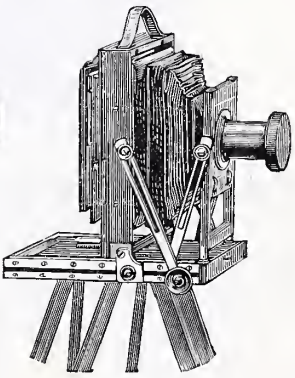


Fig. 2.

28.—**The Companion Tourist** (Parker & Co.)

Details.—Although this camera resembles others in its main details, it is nevertheless a recent introduction of the firm's, and deserves inclusion in these pages. It has rising and falling front, with great range in each direction; also reversing back. It has ample swing both to the back and

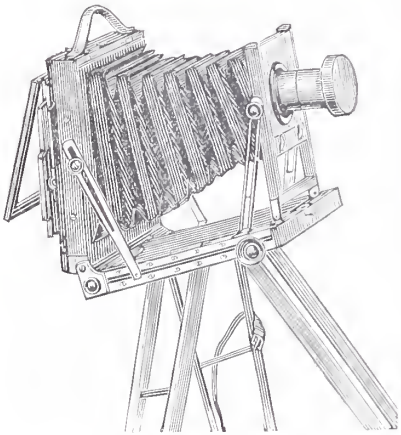
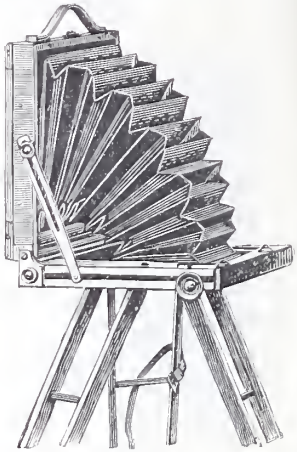


Fig. 3.



No. 28. Fig. 5.

front, and the back may be swung in either horizontal or vertical directions. The front may be swung in a vertical plane, the object of this being when the camera is used for photographing objects either a great deal above or below its own level (see fig. 3).

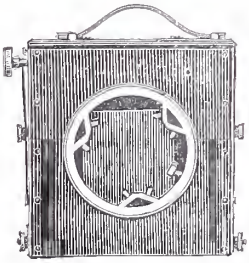
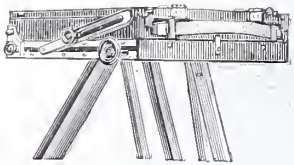


Fig. 6.



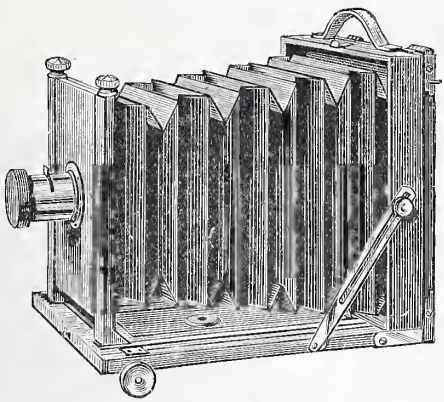
No. 28. Fig. 4.

The back portion of the camera is arranged to slide up close to the front for use with wide-angle lenses (see fig. 2), so there is no projecting baseboard to cut off the angle of view when a wide-angle lens is used.

The camera has double extension for focussing, the front moving by rackwork adjustment, the back by sliding in grooves, and held in position by clamping screws (see fig. 1). Fig. 4 shows the camera closed. Fig. 5 shows the camera part closed. Fig. 6 shows the turntable in base.

Prices, which include three double backs—

½ pl.	¼ pl.	12 × 10	15 × 12
£7 15 0	£9 15 0	£14 5 0	£18 5 0



No. 29.

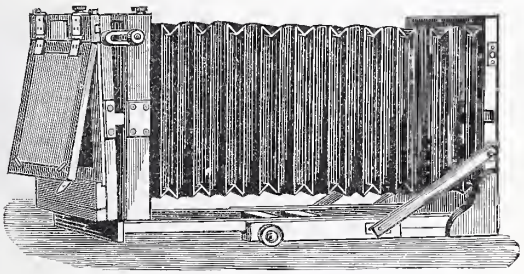
29.—**The "Amateur"** (W. B. Whittingham & Co.)

Details.—Double extension, reversing frame, swing back, rack and pinion adjustment, rising front, leather bellows, the 6½ by 4¾ camera giving a focal length from 3 inches to 17 inches. The outside size when closed being 2⅝ × 8 × 8½ inches.

Remarks.—A moderate price camera for beginners, as for those desiring a simple, non-complicated, yet efficient instrument.

Prices, with one slide—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£2 12 6	£3 5 0	£5 6 0	£7 0 0	£8 15 0



No. 30.

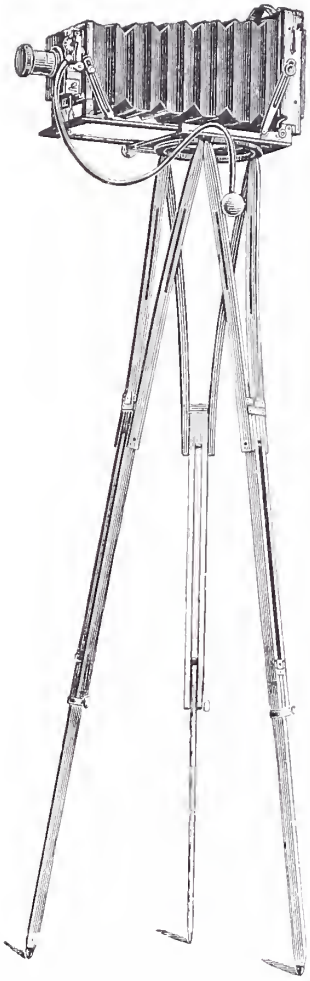
30.—**The "London"** (W. B. Whittingham & Co.)

Details.—This camera is a light, square model design, can be used for long or short focus ; it is capable of the greatest possible extension. Made of Spanish wood, with best leather bellows, double extension, double swing back, reversing frame, side swing, rising and falling front, and an extra front for second lens.

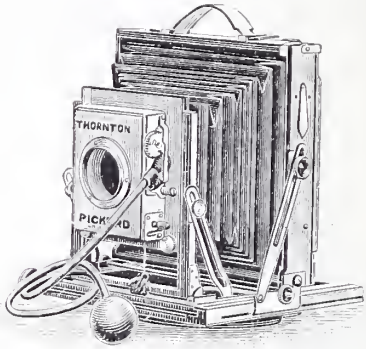
Remarks.—It will be seen from the illustration that all the extension takes place at the back, which is a decided advantage in certain kinds of work, and, moreover, tends to a more rigid front.

Prices, with three double backs—

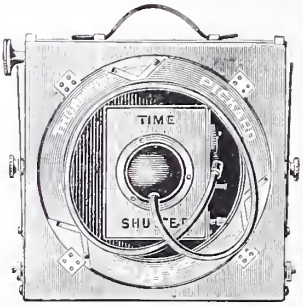
¼ pl.	½ pl.	¼ pl.	12 × 10
£6 0 0	£7 14 0	£9 0 0	£12 10 0



No. 31. Fig. 1.



No. 31. Fig. 2.



No. 31. Fig. 3.

31.—**The "Ruby"** (Thornton-Pickard Co.)

Details.—See page 273 Phot. An., 1891.

Remarks.—A very useful feature has been recently added, that of the double pinion. In many patterns where the front when erected is at the fore end of the baseboard, it becomes necessary to push the back forward a little (when using a normal focus lens) before focussing can be done with the ordinary single pinion, because the majority of lenses in general use are a little shorter in focus than the normal extension. Therefore this pushing forward of the back, or in some few cases the bringing back of the front, has practically always to be done when the camera is opened. The double pinion prevents this, for immediately the camera is opened it is

ready for focussing from the shortest to the longest possible reach, without removing the head from the focussing cloth. One or both pinions are always in gear. The new arrangement, however, in no way interferes with the usual movements. Sizes and weight:—

	½ pl.	¼ pl.
Size, folded up, allowing for all projections, but without turntable and shutter ..	$9 \times 8\frac{1}{4} \times 2\frac{1}{2}$	$11 \times 10\frac{1}{2} \times 2\frac{3}{4}$
Size with these added	$9 \times 8\frac{1}{4} \times 3$	$11 \times 10\frac{1}{2} \times 3\frac{1}{8}$
Weight complete	$3\frac{1}{2}$lbs.	5lbs.
Length of extension	16 inches.	19 inches.

Prices, which include three double slides with spring catches—

½ pl.	¼ pl.
£6 17 6	£9 10 0

Extras.—Turntable, 10/· and 12/6; tripod, 20/-; shutters, 20/- and 23/6.

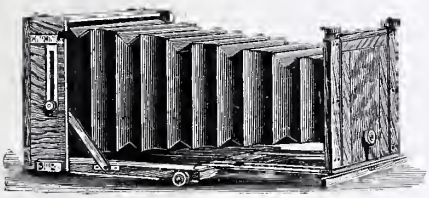


Fig. 1. No. 32.

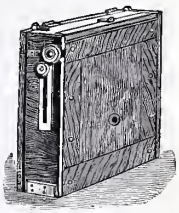


Fig. 2.

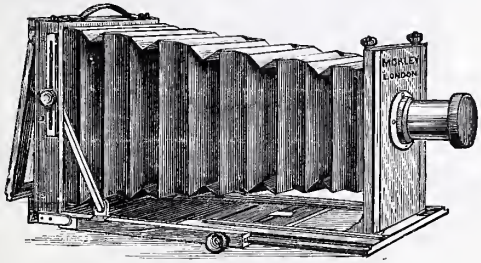
32.—**The Long Extension** (London Stereo Co.)

Details.—This is of the usual light folding pattern. Double extension, bellows taper slightly, swing and reversing back, rising front, front clamps rigid by two brass bars, rack and pinion focussing. Back portion slides forward for use with wide-angle lenses. Spring catch to lock slides in the camera.

Remarks.—Thoroughly well made and finished, and very rigid when extended.

Prices, which include three slides, with spring catches—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£9 9 0	£11 11 0	£15 15 0	£21 0 0	£25 0 0



No. 33.

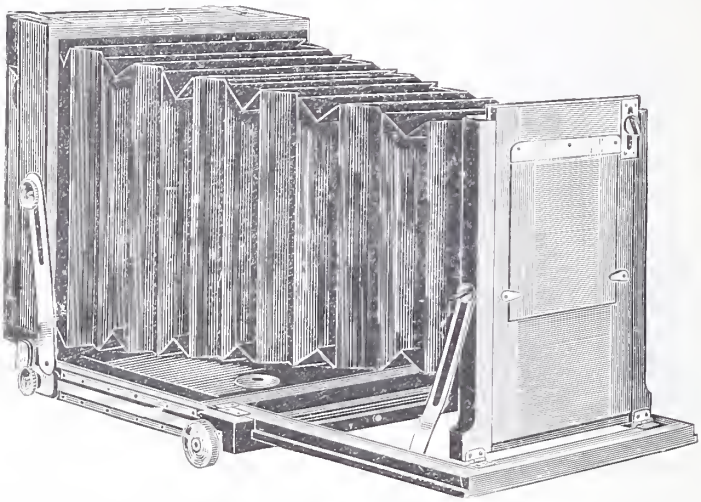
33.—**The "Simplex"** (Morley & Cooper).

Details.—A plainer camera altogether than No. 36. Double extension, conical bellows, but tapers only a little. Rack and pinion focussing, swing and reversing back. Front is a fixed one, clamped by two brass rods, but has separate rising movement. Length of extension in half-plate, 16 inches, and measures $8 \times 8\frac{1}{2} \times 2\frac{1}{4}$.

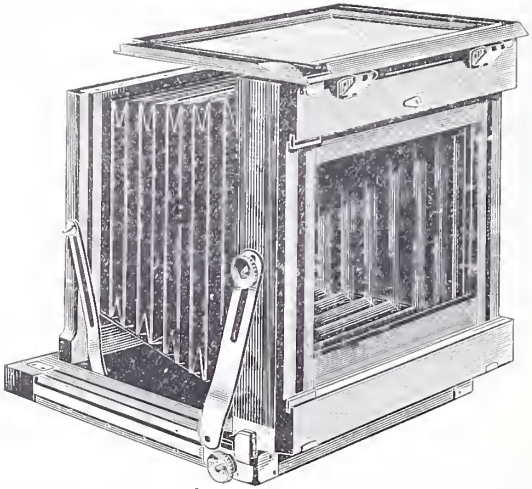
Remarks.—Certainly a cheap pattern, with a capital length of extension.

Prices, with three double slides—

¼ pl.	½ pl.	¼ pl.	12 × 10
£3 9 6	£4 10 0	£5 17 0	£9 17 0



No. 34. Fig. 1.



No. 34. Fig. 2.

34.—**Tylar's "Number Two"** (W. Tylar).

Details.—Double extension. Slightly tapering bellows. Swing and reversing back. Rising front. Rack and pinion focussing. Fig. 1 shows the camera when fully extended, and fig. 2 the normal or usual length.

Remarks.—A very good quality camera, in which expense is not spared
Prices, with three double metal or one wood slide—

¼ pl.	½ pl.	¼ pl.
£3 10 0	£5 5 0	£7 7 0

35.—**The "Magnum"** (W. F. Stanley).

Details.—This camera is arranged to take views or architectural subjects of a uniform size of 15 × 12, and is made in a manner sufficiently portable that it may be carried in a knapsack form conveniently by a tourist. Charged with six negative films ready for exposure, and fitted



Fig. 1.

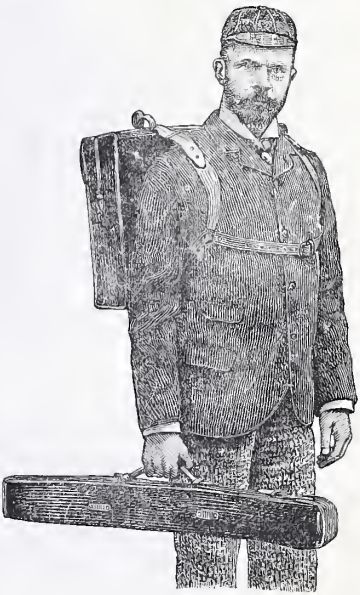
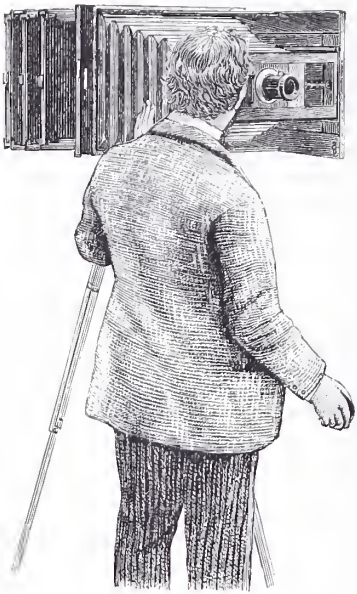


Fig. 2.

No. 35.

with a Ross rectilinear lens, the weight is only 15¾lbs. The triple folding stand, which is very rigid, weighs 4¼lbs., so that the whole equipment is 20lbs. Figs. 1 and 2 show the camera packed for travelling, and fig. 3 the appearance when ready for use. In the entire construction of the camera there is considerable novelty. One important feature is that when it is closed it forms a complete box which has a lock, so that when it is left by itself no one can interfere or injure any part of it without violence. Another important feature is that the slide of the double back draws out entirely for exposure of the plate, and there is a receptacle at the back to take it. This entirely saves injury, which hinged slides of large cameras are so very liable to in use. The lid, as it may be termed, of the box falls down, where it is held by struts, and forms the baseboard of the camera, the front of the camera carrying the lens slides out to focus on the baseboard. The focussing is taken through a hole in the front of the camera upon a white paper screen, which takes the exact position of the sensitive surface when the dark slide is removed. The three dark slides are double, and of the book form, the sensitive film being fixed in its position by fixed pins. After exposure the dark slide is turned over to take the second picture, and then placed at the back of the two other slides, by

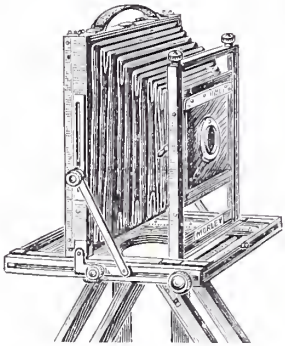


No. 35. Fig. 3.

which another slide is sprung forward ready for exposure. The camera being very light, it is necessarily sensitive to wind. To prevent this, light cord guys, similar in principle to those used for stretching a lawn tennis net, are fixed to the front of the baseboard, and pegged to the ground or to pins near the feet of the stand.

Remarks.—The camera can scarcely be considered as an amateur's one, as it requires the care in using which only persons used to outdoor photography possess, but with this care perfect pictures of the large size given, 15 × 12, may be easily taken.

Price, with Ross rectilinear lens, stand, and canvas cases complete, £30



No. 36.

36.—**The "Star"** (Morley & Cooper).

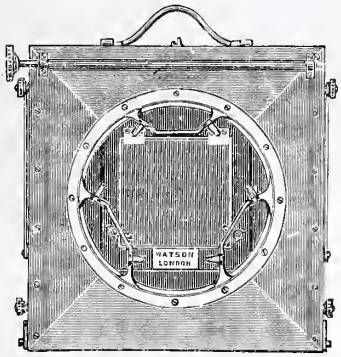
Details.—Double extension. Conical bellows. Rising and swing front. Swing and reversing back. Spring catch to lock dark slide. The reversing

frame is caught and held by a spring at the bottom. Back can be moved up to the front for short focus work. Extension of half-plate size, 14½in., measures 8 × 8½ × 2 inches closed, and weighs 3lbs.

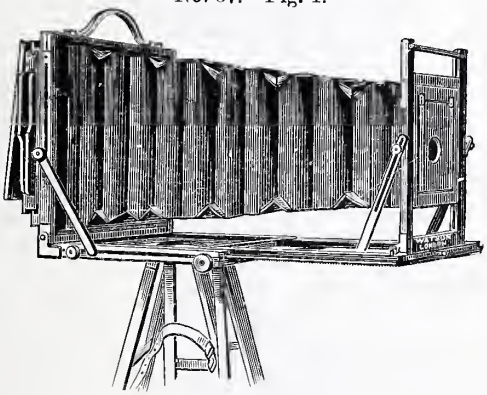
Remarks.—A very light and well made camera, at a moderate price. One slight point in construction should, however, be seen to (though possibly it only occurs in the one sent me for inspection), viz., the front won't lift out until the baseboard be extended by the rack about three-quarters of an inch.

Prices, which include three double slides—

¼ pl.	½ pl.	¼ pl.	12 × 10
£4 15 6	£5 12 6	£6 15 6	£11 5 0



No. 37. Fig. 1.



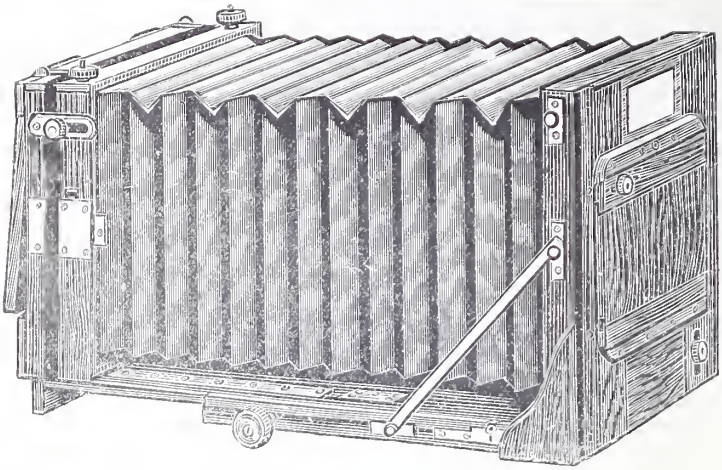
No. 37. Fig. 2.

37.—**The "Acme"** (Watson & Sons).

Details.—See Phot. An., 1891, page 280. The firm have of late devoted much attention to the substitution of aluminium for the metal work to replace the brass. For the coming season they have prepared all sizes so mounted. A saving of nearly 25 per cent. in weight is effected by the change, and by careful selection of alloy, the metal parts are as strong as they were in brass. The extra cost is moderate, and readers should not forget that in addition to a gain in portability, aluminium considerably enhances the appearance.

Prices, with turntable in aluminium as well—

½ pl.	¼ pl.	12 × 10	15 × 12
£3 0 0	£3 10 0	£5 0 0	£6 0 0



No. 38.

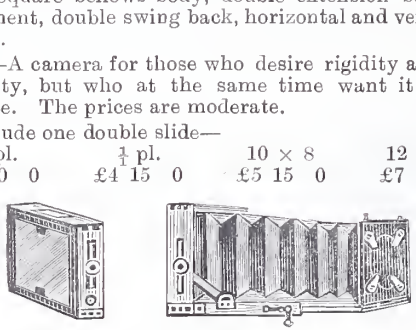
38.—**The "Universal"** (Braine & Sons).

Details.—Square bellows body, double extension baseboard, rack and pinion adjustment, double swing back, horizontal and vertical sliding front, reversing back.

Remarks.—A camera for those who desire rigidity and simplicity more than portability, but who at the same time want it to fold up into a moderate space. The prices are moderate.

Prices include one double slide—

½ pl.	¼ pl.	10 × 8	12 × 10
£3 10 0	£4 15 0	£5 15 0	£7 10 0



No. 39.

39.—**The "Pocket"** (Braine & Sons).

Details.—Double extension, leather bellows, slightly tapering, swing back, rising front, rack and pinion focussing. The quarter-plate size measures when closed only 1⅝in. thick.

Remarks.—It is certainly very compact, and the absence of outside fittings makes it extremely portable.

Prices, with three double dark slides—¼ pl., £3; 5 × 4, £3 10s.

40.—**The "Artist"** (W. B. Whittingham & Co.)

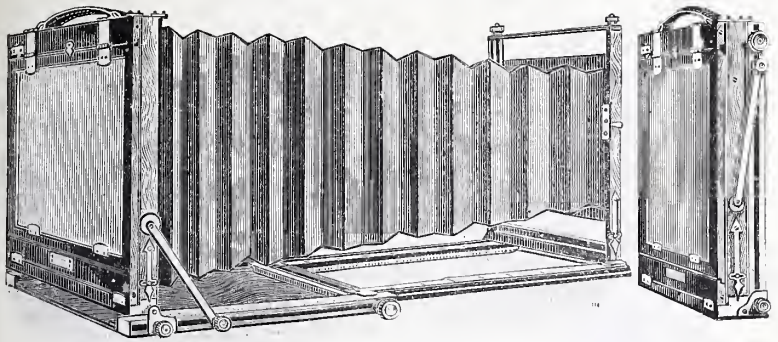
Details.—The camera is made square with reversing frame, best quality leather conical bellows, swing back, side swing, rising and falling front, rack and pinion, double extension.

Remarks.—This is not so elaborate as the "Aerial" No. 23, though it is built on the same model, and is as efficient. A little economy is studied in the construction, and hence it is cheaper.

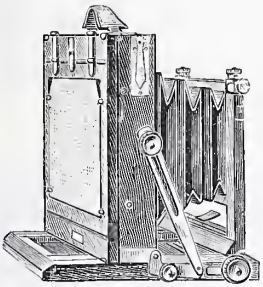
Prices, with three double backs—

½ pl.	¼ pl.	12 × 10	12 × 15
£6 0 0	£7 10 0	£12 15 0	£16 10 0

Extras.—Turntable and tripod, as No. 23.



No. 40.

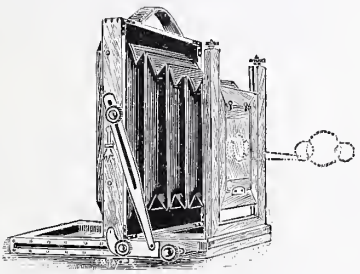


No. 41.

41.—The "Norden" No. 2 (S. & J. Mitchell).

Details.—A camera of the usual pattern, but with special adaptation for stereoscopic work by means of a removable partition. Double extension, best leather bellows, rack and pinion, reversing back, swing back, double hinged focussing screen, back of camera can be moved up to front for use with short-focus lenses, the slides have double hinged shutters and automatic locks to shutters, extra lens board, leather handle, patent level.

Price, with three double backs and two fronts, £5 5s.



No. 42.

42.—The "Norden" No. 3 (S. & J. Mitchell).

Details.—A camera like No. 41, of the ordinary type, but specially constructed for stereo work, having a removable partition for ½ plate work Very light, and yet rigid.

Price, with three double backs and two fronts, £7 10s.

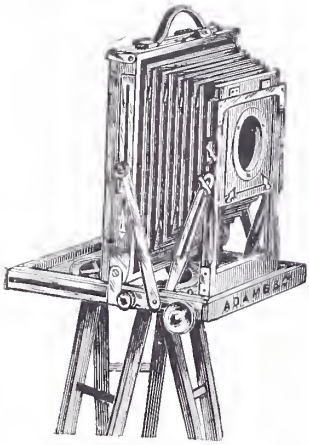


Fig. 1.

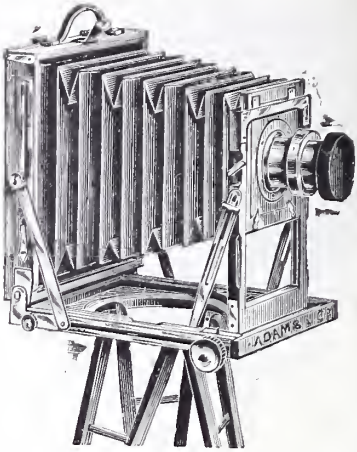


Fig. 2.



Fig. 3.

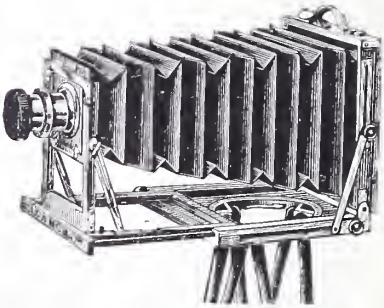


Fig. 4.

No. 43.

43.—**The Aluminium Club** (Adams & Co.)

Details.—See Phot. An., 1891, page 270.

Remarks.—By the replacing of brass with aluminium, this camera is reduced in weight by quite a fourth, without in any way impairing its rigidity.

Prices and details, three double backs included—

Size.	*Measurements.*	*Extension.*	*Approx. Weight.*	*Price.*
½ pl. ..	$8\frac{1}{2} \times 8\frac{3}{4} \times 1\frac{3}{4}$ ..	16 in. ..	2lbs. 2ozs. ..	£13 0 0
¼ pl. ..	$10\frac{1}{2} \times 10\frac{3}{4} \times 1\frac{3}{4}$ ..	19 ,, ..	3 ,, 6 ,, ..	15 5 0
12 × 10 ..	$14\frac{1}{2} \times 14\frac{1}{2} \times 2\frac{3}{4}$ ..	27 ,, ..	6 ,, 12 ,, ..	21 15 0
15 × 12 ..	$17\frac{1}{2} \times 17\frac{1}{2} \times 3$ ..	33 ,, ..	10 ,, ..	27 0 0

44.—**The "Book"** (Braine & Sons).

Details.—This is quite a novelty. Fig. 1 shows the camera when folded, when it really does resemble a book. In fig. 2 the extension is shown, and it will be seen that it is in every respect an ordinary double extension camera. One lid forms the baseboard, which is kept rigid by the brass rod and screw. It measures 6 by 5½ by 2 when closed, and weighs 1lb. It has swing back, rising front, double extension baseboard, rack and pinion



Fig. 1.

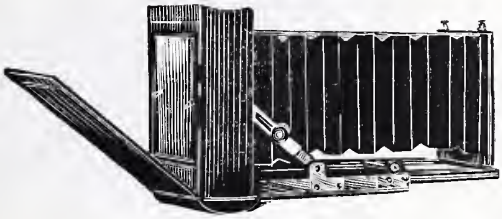


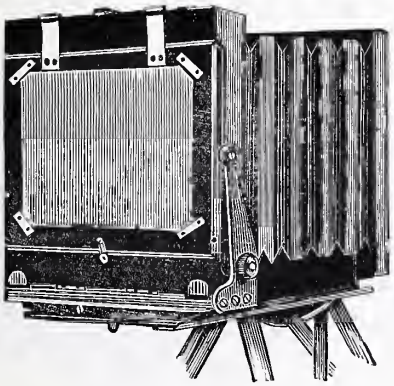
Fig. 2.

No. 44.

adjustment. The camera is best mahogany, is bound in morocco leather, and is without a single outside fitting.

Remarks.—Certainly ingenious. When folded up it looks like a thick prayer-book.

Prices, with three double slides, ¼ pl., £3; 5 x 4, £4.



No. 45.

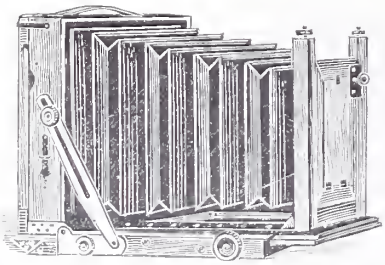
45.—**"The Tourist"** (Braine & Sons).

Details.—Single extension camera with square best leather bellows, double swing back, vertical sliding front, reversing back to take pictures both ways, double hinged focussing screen, and folding baseboard. The focal length is sufficient to take any ordinary lens.

The camera is set up in a few seconds and all the movements are simple.

Prices, with one double slide—

¼ pl.	½ pl.	¼ pl.
£1 3 0	£1 10 0	£2 10 0



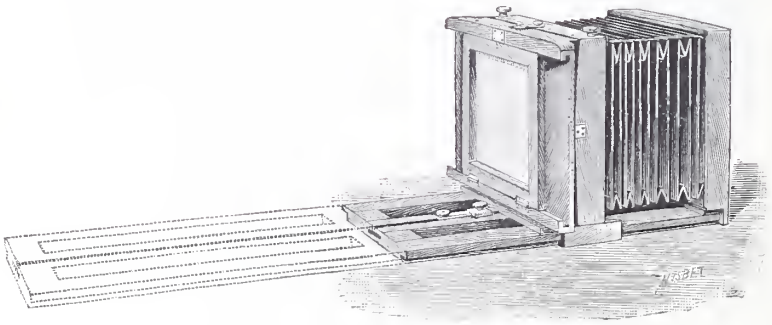
No. 46.

46.—**The "Vevers"** (C. C. Vevers).

Details.—A new pattern to supersede the one noticed in Phot. An., 1891, page 262. Best long extension conical leather bellows, rack and pinion focussing adjustment, reversing and double swing back, plummet, rising and falling front, changeable lens board, and the back of the camera can be brought forward in slotted plate in baseboard and fixed at any part for use with wide angle lenses.

Prices, which include one best double back—

¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£2 15 0	£3 15 0	£5 5 0	£8 15 0	£10 0 0



No. 47.

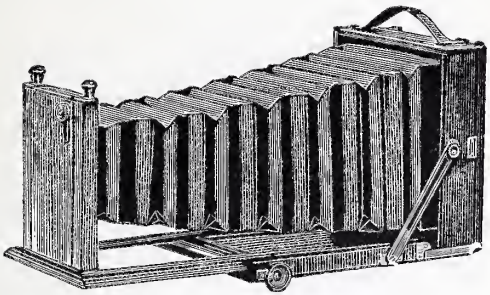
47.—**The "Serviceable"** (McGhie & Co.)

Details.—A camera for ordinary studio work, with a special extending tailboard attachment for copying and enlarging work. Swing and repeating back, leather bellows, rack focussing.

Remarks.—Extremely convenient, and saves the expense of a separate camera for the many copying and enlarging orders the professional receives in the ordinary course of business, such as cartes to cabinet or imperial, tintypes to cartes and cabinets, &c. The whole plate extends to 45 inches and closes to 6 inches.

Prices, with one double slide and carriers—

½ pl.	¼ pl.	10 × 8	12 × 10
£6 0 0	£7 10 0	£9 0 0	£10 10 0



No. 48.

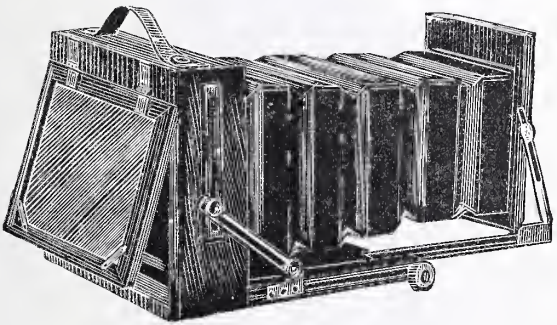
48.—**The "Modern"** (Braine & Sons).

Details.—Double extension, conical leather bellows, swing and reversing back, rising front, rack and pinion focussing. The extension is long enough for the single combination of an ordinary R.R. lens.

Remarks.—A good instrument, for the money asked for it.

Prices, with one double slide—

½ pl.	½ pl.	¼ pl.	10 × 8	12 × 10
£1 15 0	£2 2 0	£3 15 0	£5 0 0	£6 14 0



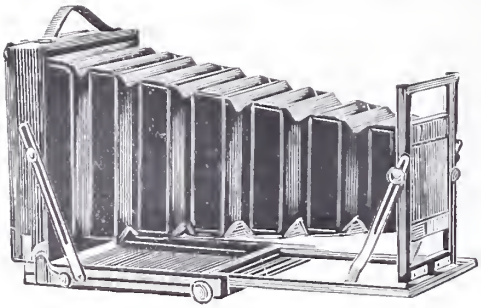
No. 49.

49.—**The "Export"** (Braine & Sons).

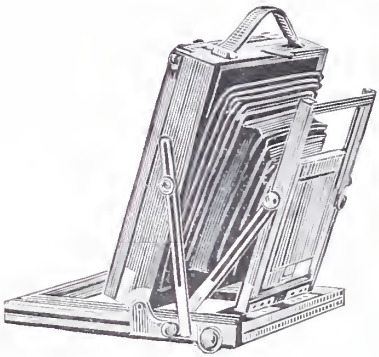
Details.—This differs from No. 48, the "Modern," principally in the front, which in this pattern is always in position for drawing out. The bellows, too, does not taper so much. Double extension. Swing and reversing back. Swing and rising front. Rack and pinion focussing. The brass struts make the front very rigid. The slides drop into the reversing frame, with only about 1in. of slide.

Prices include one double slide—

½ pl.	¼ pl.	10 × 8	12 × 10
£3 0 0	£4 10 0	£5 10 0	£7 0 0



No 50. Fig 1.



No. 50. Fig. 2.

50.—**The "Viceroy"** (Braine & Sons).

Details.—It has double swing back, rack and pinion adjustment, conical leather bellows, which rises with the front of camera, swing front and reversing back. The back of camera draws up to front for short focus lenses. It closes into very small compass (the ½-plate measuring 2¼in.) and it is very light. The movements are simple, and there is nothing whatever to get out of order. The slides are of the best pattern, with hinged partitions.

Remarks.—One of the modern wide-angle patterns at very moderate

Prices, which include one slide—

½ pl.	¼ pl.	10 × 8	12 × 10
£4 0 0	£5 0 0	£6 0 0	£7 15 0

HAND CAMERAS.

The following were noticed in the "Photographers' Indispensable Handbook":—

Academy ...	...Marion	Newton's ...	...Newton	Watch ...	...Lancaster
Eclipse, 1887	...Shew	Parcel ...	...Marion	Watson's ...	...Watson
Jubilee ...	... ,,	Photo Gun	...Sands		
Metal Miniature	...Marion	Stirn's Secret	...Robinson		

The following were noticed in "Photography Annual" 1891:—

Adams ...	...	Griffin ...	...Griffin	Presto ...	...Franks
Adelphi ...	...Miller	Guinea ...	...Griffiths	Quadrant ...	...Humphries
American ...	...Hockin	Guinea & Half	...Griffiths	Radial ...	...Marion
Aptus ...	...Sharp	Hunting Box	...Wood	Rambler ...	...Beck
Artist ...	...Stereo Co.	Ideal ...	.. Adams	Reflector ...	...Underwood
,, Stereo	...Stereo Co.	Itakit ...	...Matthews	Reflex ...	...Loman
,, Twin	...Stereo Co.	Kalif ...	...Underwood	,, Special	...Loman
Automat ...	...Underwood	Key	...Platinotype	Repeater ...	...Cusworth
Automatic ...	...Houghton	Kodak ...	...Eastman	Roberts ...	...Roberts
Baird's ...	...	London ...	...Houghton	Ross's ...	...
Beck's ...	...	Longshot ...	...Lancaster	Rover ...	...Lancaster
City	...Underwood	Luzo ...	..Robinson	Shew's Box Pattern	
Climax ...	...Watson	Matchless...	...Bloomer	,, Combination	
Collins ...	...	McKellen ...	...Marion	Simplex ...	...Vevers's
Companion ..	...Parker	Memorandum	...Swift	Snap Shot...	...Lancaster
Cyclist ...	...Turnbull	Miall ...	...Fallowfield	Sphinx ...	...Underwood
Dispatch ...	...Stereo Co.	M. S. Detector	...McKellen	Stereoscope	...Griffiths
Double ...	...Marion	Necktie ...	...	Stereoscopic	...Chadwick
Eclipse ...	...Shew	Optimus ...	...P. S. & R.	Swindon & Earp's.	
,, Extending	...Shew	,, Magazine.	P. S. & R.	Talmer ...	...Talbot
,, Stereo	...Shew	Paragon ...	...Browning	Universal...	...Brooker
Eureka ...	...Rouch	Popular ...	...King	Vanneck ...	...Watson
Facile ...	...Fallowfield	Practical ...	...Chadwick	Viator ...	...Mercer
Graphic ...	...Stereo Co.	Presto ...	...Crouch	Zeus ...	...Schölzig



No. 51. Fig. 1.

51.—**The "Miall"** (J. Fallowfield).

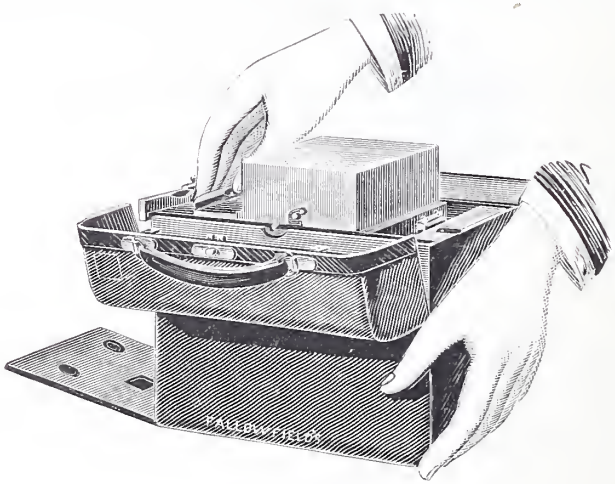
Features.—Lever movement. Removable reservoir.

Description.—This camera appeared just as the 1891 Annual was in the press, and it was only possible to squeeze in a brief outline (page 344). In appearance the "Miall" represents a small handbag. This, of course, is not novel, but it retains this feature whether in use or not, and thereby possesses a marked advantage. All the necessary movements are underneath, and, therefore, out of sight. These are shown in fig. 2.



No. 51. Fig. 2.

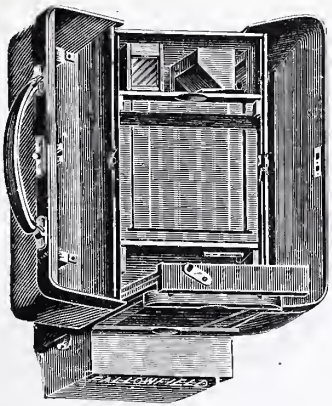
It is not even necessary to open the bag to change a plate, as it is with the Ross grooved reservoir pattern. The only time the opening of the bag itself occurs is when it is desired to change—not the one plate, but—the twelve. The lens and finders are uncovered by sliding sheaths or covers of the same leather, and this is all that is needful, as far as showing the nature of the article in the hand is concerned. There is not a solitary projection or movement in view, because even those which are placed at the bottom can be worked without lifting or turning the bag. These movements are—setting and discharging shutter, alteration of speed of same, altering the Iris diaphragm, focussing to scale, and changing the plate. The plates (which are in sheaths) lie in a plain reservoir face downwards. Upon pulling the lever they fall into the exposing chamber, the pushing back of



No. 51. Fig. 3.

the lever placing them into position ready for exposure. The action is simple, and one that I should judge to be unlikely to get out of order. Each plate, as it is thus pushed into position, comes in front of its predecessor in a special chamber at the back; and as soon as the twelve are all thus dealt with, the changing box comes into play. This will be seen in fig. 3.

This consists of plain box with sliding lid, which is first placed upon the top of the unexposed plate reservoir. When the lids, both of the changing box and reservoir, are withdrawn, the sheaths fall of their own weight into the receptacle. The lids are then shut, and the box is removed. We have now, therefore, twelve plates exposed in the lower chamber, and twelve ready for use in the upper one. The changing box, which is, of course, empty, is next fastened to the back, as shown in fig. 4, the camera



No. 51. Fig. 4.

slightly tilted, two lids or shutters withdrawn, and, presto, the exposed plates fall into the box again, and the camera is ready for use with a fresh supply of plates. There are several ingenious arrangements which, however, space will not permit of entering into But there is one I should like to call attention to, which is that the exposed plates cannot be removed until the whole dozen have been used. This is managed by a sort of spring fan at the back, which serves to keep the plates up to register during exposure. Until that is pressed back far enough, which only the complete number of sheaths will effect, it catches against the top, and the shutter or lid cannot be withdrawn. Therefore, the plates are intact as far as the back is concerned, until the proper time for changing arrives. Of course, any method of dropping the plates into the box at the back necessitates an opening or aperture, and that opening might easily be tampered with. But this fan arrangement, simple as it is, shows that the designer of the camera kept many contingencies in front of him.

The other details of the "Miall" are that it weighs about 5lbs. and measures 10 × 7 × 6 inches. The lens is similar to the one in the "Facile," being an R.R. of 5½ inches focus. The Iris diaphragm can be adjusted from outside at f/8, 11, 16, 22, 44, by means of the lever arm and indicator. The shutter works between the lenses, and by the speed indicator can be set to work at $\frac{1}{10}$, $\frac{1}{25}$, $\frac{1}{50}$, $\frac{1}{100}$ second. If the setter is held back by an arm, an exposure of any length may be given by using only the safety shutter, which works automatically, so that the process of setting shutter cannot expose a plate.

Focussing is done by the usual scale for 6, 8, 10, 12, 14, or 16 feet, after which it works at fixed focus.

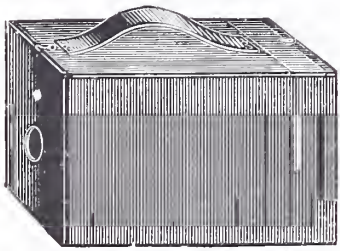
The finders are of the well-known "Facile" pattern, sunk down deep in camera.

Finally, there is a pretty arrangement of a shutter inside flap, which falls when trigger is pressed, and the front shutter only released at the last moment. The plate is held in register at both the top and the bottom.

Price £9 15s.

Extra.—Store boxes, 15s. each.

The illustration on the next page is a shot taken in the "Miall" with stop *f*/11, and an exposure of $\frac{1}{10}$th second. The gentleman preparing is A. R. Dresser, the one on guard, with a "touch-him-if-you-dare" pose, is the genial editor of *Photography*, Henry Sturmey, whilst looking on is Mr. Werner, of Dublin.



No. 52.

52.—**Ashford's Guinea** (J. Ashford).

Features.—Dark slides, unobtrusive, lightness.

Description.—The outer casing is of plain black wood, resembling ebony in appearance, and there are no projections whatever to attract attention. The front lets down to set the shutter, which is upon the simple rebound principle. The slides, which are of wood, with metal shutters, are inserted through the top at the back of camera, and are covered up by the small door. In inserting the slides, it is necessary to push them down with sufficient force to depress the spring which is underneath, so that the slide can be forced under the strip of metal at the top. This piece of metal serves the double purpose of keeping it light-tight, and preventing the slide being pulled out of camera when withdrawing the shutter. When the shutter is withdrawn, it may be placed at back of slide in camera. In withdrawing slide, the top part of it is simply pulled from under the piece of metal, and it springs up so that it may be taken hold of. The back of camera also opens, but it is only necessary to open this when the lens requires cleaning, for which purposes it unscrews from the tube. The lens is, of course, a single combination.

Remarks.—A very neat little camera, extremely light, and exceedingly unobtrusive.

Price, with three double dark slides, £1 1s.



Preparing for Action.



No. 53.

53.—**The "Alert"** (R. & A. J. Mercer).

Features.—Well. Arm or lever movement.

Description.—This pattern holds 12 ¼-plates, which are contained in sheaths. It measures outside 10 × 7 × 5 inches, and weighs when charged complete about 3½ lbs. It is fitted with a 5 × 4 rapid rectilinear lens, working at f/8, and has a set of Waterhouse diaphragms. A special roller blind shutter is fitted, which can be adjusted to give either slow or instantaneous exposures, as desired. An immediate or safety shutter is also provided: this is situated behind the lens, and thus ensures perfect protection to the plate during the winding-up of the blind shutter. It may also be serviceably employed for prolonged exposures, when the camera is used on a stand as an ordinary camera. The lens being a fixed focus one, all objects at 20 feet and beyond are in proper focus. The changing method is by means of an arm worked from the outside, which carries the plate down to the well, and returning for the next, which has meanwhile been pressed into position by the springs at the back.

Remarks.—Although I do not care very much for any system employing projecting pieces of wire attached to the sheaths, I must confess that my trials of the "Alert" have been favourable to correct working.

Price, covered in leather, £3 10s.

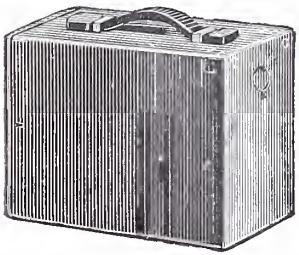


Fig. 1.

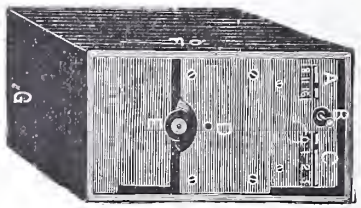


Fig. 2.

No. 54.

54.—**The "Ideal" No. 2.**

Description.—The "Ideal" described on page 288 Phot. An., 1891, was a fixed focus one. This year, however, the No. 2 has been brought out with a focussing arrangement at once neat and ingenious. The extension, of course, takes place at the front, and the distances are registered in the usual way on a plate. Fig. 1 gives a general idea of the camera closed, and fig. 2 shows the working parts, which are all underneath and nicely out of sight. In other details No. 2 is the same as the No. 1.

Remarks.—The focussing will meet the views of those who object to fixed focus cameras, and ought to be a still greater success.

Prices—	12 pl.	18 pl.	24 pl.
	£8 10 0	£9 10 0	£10 10 0

The illustration on the next page is from a shot in the "Ideal," taken on the West Coast of Scotland, the stop used being f/16, the shutter working at about $\frac{1}{50}$th, and the plate of ordinary rapidity, *i.e.*, not extra rapid.



OFF FOR A SAIL.

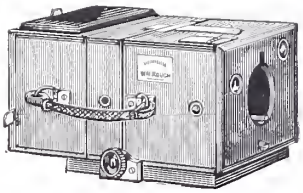
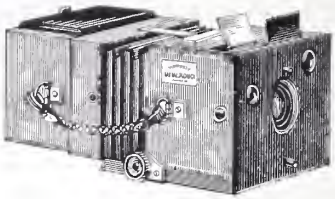


Fig. 1.



No. 55. Fig. 2.

55.—**The "Excelsior"** (Rouch & Co.)

Features.—Bag changer. Adjustable for long focus lenses.

Description.—Briefly put, this is a very much improved "Eureka," see page 319 Phot An., 1891. At the same time it is considerably different, and several useful points are gained. It can be used with either the "Eureka" back, ordinary double slides, or with a roll holder. Fig 1 shows the camera closed, and as used with a short focus or wide-angle lens. In fig. 2 the method of extension will be clearly seen. Owing to the provision made for the use of wide-angle lenses, the camera is constructed to close into a small space, and when it is detached from the back it measures only 5½ inches in length. The camera is fitted with rack and pinion adjustment, and by the fact of the plate reservoir being removable the "Excelsior" is converted into an ordinary quarter-plate camera. The focussing glass can be employed in the usual manner for selecting and arranging the picture. But the features which chiefly distinguish it from other instruments are—First, the power of using lenses of widely different focus. Though many hand cameras are adjustable in focus for a single lens, in the "Excelsior" provision is made for the use of both wide and ordinary angle lenses. It is fitted with a rapid rectilinear lens for ordinary shutter and general landscape work or portraiture, and with a wide-angle rectilinear of considerably shorter focus for interiors, and views in confined situations. Each of these has its separate outside focussing scale, and can be used with or without the focussing glass. Secondly, a novel feature in this kind of camera is introduced, which specially adapts it for architectural work, a

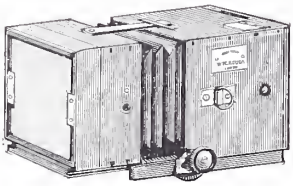
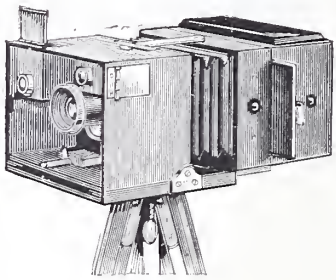


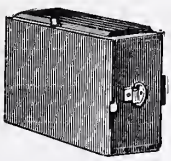
Fig. 3.



No. 55. Fig. 4.

branch in which the ordinary band camera is usually at some disadvantage. By suitable means, which add nothing to the bulk of the instrument, a *rising front* is provided, which enables the lens to be raised to any desired height, so as to bring on to the plate objects, or portions of objects, that would otherwise necessitate tilting the camera.

Fig. 3 shows the camera with focussing glass in position, and fig. 4 the front open. The "Eureka" back, too, is altered somewhat, and fig. 5 shows it as it now is, with the covering lid over the bag.



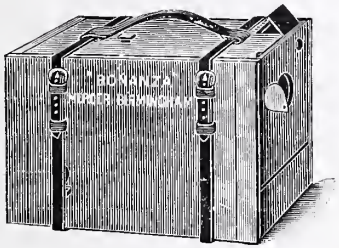
No. 55. Fig. 5.

Remarks.—The "Excelsior" might well be termed an "all-round" pattern, and yet it is anything but bulky. The powers afforded by the improvements upon the "Eureka" are most creditable to the makers.

Prices, with two lenses—

¼ pl.	5 × 4
£10 10 0	£14 14 0

Extra.—Vertical swing back, which can be added without increasing the bulk at all, 15s.



No. 56.

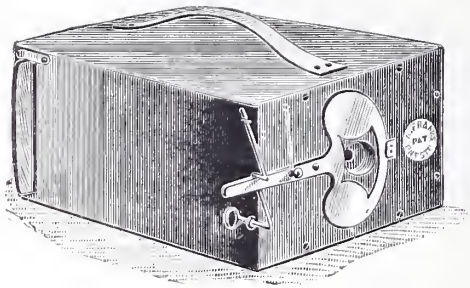
56.—**The "Bonanza"** (R. & A. J. Mercer).

Features.—Well system.

Description.—The camera holds 12 plates or films, which are contained in a reservoir. It measures outside 8 × 6 × 10½in. The weight when charged complete with one dozen plates is about 4¾lbs. A 5 × 4 extra rapid rectilinear is fitted with a working aperture of f/8, and is complete with a set of Waterhouse diaphragms in leather case. It is a fixed focus, all objects at 20 feet and beyond are sharp. A modified Thornton-Pickard roller blind shutter is fitted. It can readily be adjusted to work slowly or at high speed in any position, and will not go off accidentally. There is in addition a safety shutter which affords protection to the sensitive plate, while winding up the shutter proper. Changing is effected by turning a release catch on top, and a half turn upon another button at the side, which tilts the reservoir over, the plate falling into the well.

Remarks.—In my hands it has worked extremely well, and I should term it an excellent camera at a low price.

Price, covered in leather, with leather straps and handles, £3 3s.



No. 57.

57.—**The "Presto" No. 1** (A. Franks).

Description.—See Phot. An., 1891, page 342. This season a double dark slide replaces the single one, and yet the

Price remains the same, 10s. 6d.



No. 58.

58.—**The "Presto" No. 2** (A. Franks).

Description.—The size is increased slightly to provide room for six dark slides and focussing screen, viz., $10 \times 5\frac{1}{2} \times 4\frac{1}{2}$. Another feature is that the shutter is concealed, and there is a view finder.

Price, £1 1s.

59.—**The "Radial"** (Marion & Co.)

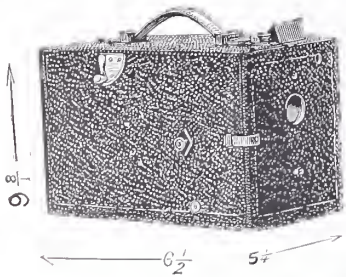
This was dealt with on page 300, Phot. An., 1891, but two new sizes are now made, viz., lantern slide size and ½ plate.

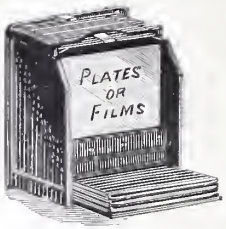
Prices—	$3\frac{1}{4} \times 3\frac{1}{4}$	½ pl.
Polished mahogany	£5 15 0	£12 0 0
Morocco leather	6 6 0	13 0 0



THE BLIND BEGGAR AND HIS DOG.

(Taken in a ¼ plate "Radial."





No. 60.

60.—**The "Companion"** (Parker & Co.)

Features.—Weli system. Spring to prevent rattling.

Description.—See page 311, Phot. An., 1891. For this season the improvements lie in the direction of neatness and consequent decrease of weight.

Price, with landscape lens, £4 4s.; with R.R. lens and rotating stops, £5 5s.

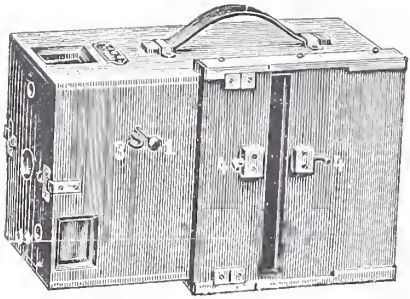


Fig. 1.

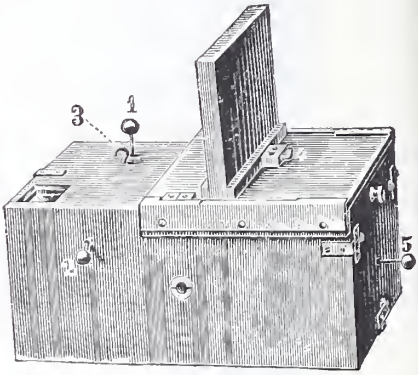


Fig. 2.

No. 61.

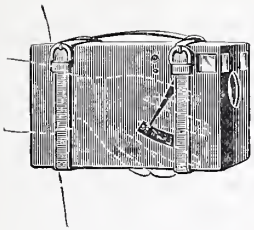
61.—**The "Success"** (Sheffield Photo. Co.)

Features.—Travelling slide.

Description.—The exterior is a plain walnut wood. The lens is a double combination, with a shutter behind possessing also a covering, so that setting the shutter does not uncover the plate. About half the body of the camera is the reservoir in which the plates (in sheaths) are stored. They are pressed into register by a movable spring, which is shown in fig. 2 at the back (5). To change the plate a plain wood case is attached to a slot (see 4, fig. 1) and there fastened. This is shown in position in fig. 2. The camera is now turned over, the spring at back (5) pulled away by the string, and the plate falls into the case. The top travels, so as to bring the case over another groove at the back into which the plate falls behind the others. The illustrations show very clearly the camera as it actually is, and the method of use. The ¼ plate measures 10 × 5½ × 4½.

Remarks.—Very simple, and with the least care in the operations there should be no chance of failure. The one I have used worked perfectly. It is a cheap camera, too.

Prices.—3½ × 2⅜	¼ pl.	½ pl.	Stereo.
£1 7 6	£2 10 0	£4 4 0	£4 4 0

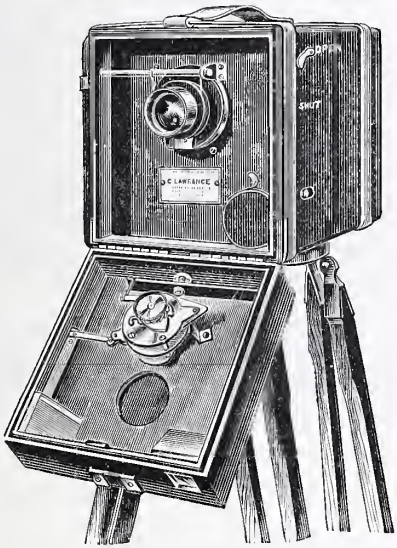


No. 62. Fig. 1.

62.—**The "Clifford"** (C. Lawrance).

Features.—Sheathes in a book form.

Description.—Fig. 1 shows the camera closed. Fig. 2 shows the front let down, revealing the shutter and lens, &c.

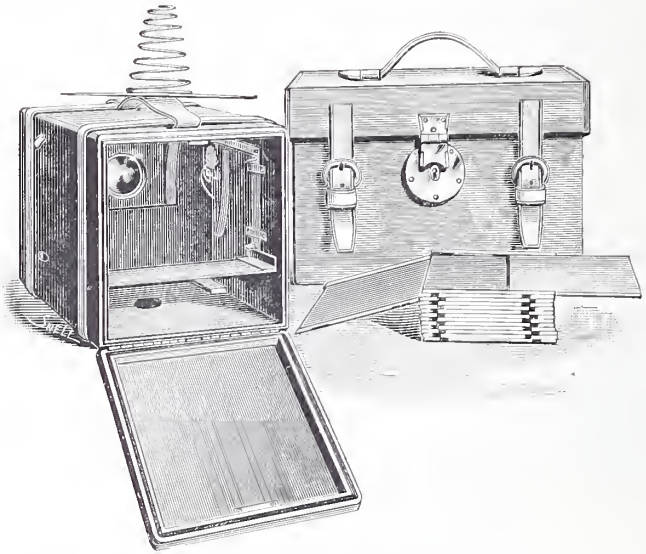


No. 62. Fig. 2.

The method of changing may be gleaned from the following description. The plate-holders, or sheaths, are bound or hinged together on the bottom side with a front cover to protect first plate. To fill the holders with plates (in the dark room), the book is laid down on table front side up, the cover turned, the corner of plate pressed against spring until the other end of plate is in the sheath, and the plate slided in, when the spring will keep it in its place. The sheath is then turned over with plate in, and the same operation with each one until all the plates are in. To put the book in camera, the camera is tilted front up, the book held face up in right hand, the hinged side brought to rest on metal shelf, the book placed in and camera turned. The board is laid against the back of book, the spiral

spring pressed down and the lid shut. When the book is in the camera the indicator in right hand side of camera is set at O. To let the cover down, the knob is drawn back on left hand side, which releases the cover, and the first plate is in position, which the indicator will denote. Each movement of the knob changes a plate until all are exposed. When all the plates are let down, the front of the camera is tilted up, when the book of plate-holders will slide under the shelf and are kept there by two springs, which prevent them from sliding back and forward in bottom of camera. Should it be found necessary to open front of camera to wind the shutter or change the diaphragm, a spring flap covers the aperture behind the lens, making the interior of camera perfectly light-tight while the front cover is open. The camera can be turned on its side for an upright picture, but to change the plate the camera must be turned the right way up and slightly tilted forward.

Fig. 3 shows the interior of the camera, the book of sheaths, and the covering case.



No. 62. Fig. 3.

The shutter is capable of about forty exposures with one winding, and is adjustable as to speed by a brake. When, however, the brake is used, it is advisable to wind up the shutter each time. At its fastest it registers about $\frac{1}{50}$th of a second. The lens is one of those known as fixed focus, by Taylor, Taylor and Hobson, the $\frac{1}{4}$-plate size having as a limit 13 feet, and the 5 × 4 19 feet. Three kinds of books are made.

For 12 ordinary plates.
,, 20 thin ,,
,, 30 films.

Remarks.—Very ingenious, and appears to work easily.

Prices, with one book for 12 plates—

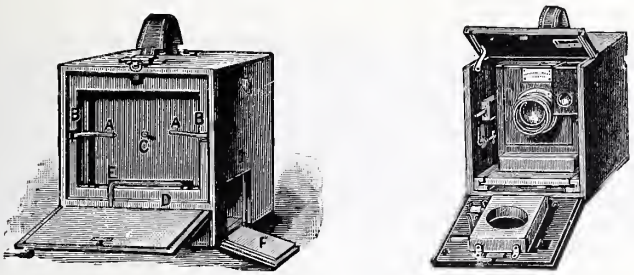
$\frac{1}{4}$ pl.	5 × 4
£10 12 0	£11 13 0

Extras.—Book for more than 12 at 1s. 6d. per sheath extra. Finders from 6s. 6d.



WAITING FOR THE TIDE.

From a Negative taken in a "Facile" Hand Camera.



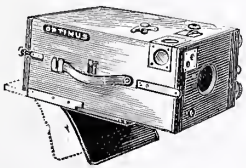
No. 63.

63.—**The "S. & E."** (Swinden & Earp).

Details.—See Phot. An., 1891, p. 320.

Remarks.—The principal change made is that sheaths are now provided for, as well as the ordinary backed plates, the mechanism working both with equal facility. For use near home sheaths are very handy, but away it is very different. The plates can be backed at the leisure of the photographer, and then stored away face to face ready for use at any future time. When touring, the advantages are multiplied, as the whole batch of exposed plates can be removed, and the camera recharged in less than one-tenth the time taken up with metal sheaths or dark slides; besides, the plates can be numbered, and their subjects noted on the back of each. The plates on removal from the camera require no further packing than to be placed face to face in their original boxes, the over-lap of the paper backing forming sufficient separation to prevent injury to the film. In order to effect this change, the brass teeth and bolts by which the automatic changing of plates is carried out are substituted by *steel* teeth, whereby greater durability and resistance are secured. Trifling alterations, with a view to improve the fittings and covering of camera, have been made.

Prices—¼ pl., £7; 5 × 4, £8.



No. 64.

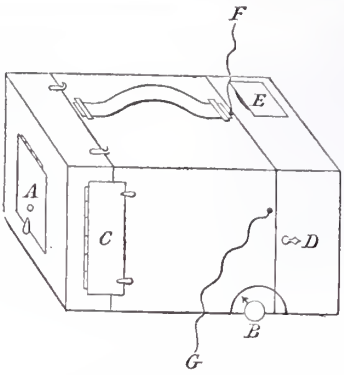
64.—**The "Minimus"** (Perken, Son & Rayment).

Features.—Bag changing, but from below.

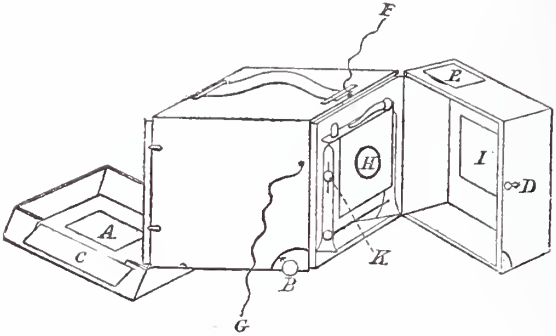
Description.—This is a bag changer, but instead of the plates being lifted they are dropped into a bag, from whence they are transferred to the rear by the fingers. It is issued either in mahogany or covered with leather, and is fitted with the "Optimus" rapid Euryscope lens. The outside dimensions are 8 × 5 × 3½ inches. The register indicating the number of plate offered for exposure being attached to the last sheath renders it impossible for the same plate to be twice exposed. It is provided with focussing adjustment and view finder, also with a curtain shutter which gives slow or rapid exposures.

Remarks.—Very neat indeed in size, and works excellently.

Price £7 7s.



No. 65. Fig. 1.



No. 65. Fig. 2.

65.—**The "Universal"** (A. Brooker).

Features.—Dark slides. Movements of ordinary camera.

Description.—This camera was noticed in advance on page 333 Phot. An., 1891, and a description of the illustrations above is all that is necessary. Fig. 1 shows the camera closed, and fig. 2 open. The back and front take right off. A, hinged door for focussing; B, milled head, pointer and dial for focussing; C, door for inserting dark slides; D, key-hole; E, view finder; F, string for releasing shutter; G, string for setting shutter; H, shutter where lens is screwed on; I, door for exposing through; K, milled head of swing and rising front. Outside measurement, $8\frac{3}{4} \times 6\frac{1}{2} \times 5\frac{3}{4}$. Weight, with three dark slides, $3\frac{3}{4}$lbs. It has only one small projection—the milled head for focussing. Any lens may be used from $3\frac{1}{2}$ to 8in. equiv. focus. The shutter is always ready (behind the lens), which can be used or not, as required. It has all the movements of an ordinary camera, including focussing screen, rising and falling front, swing front for architectural or street views, and dark chamber, doing away with use of cloth. The shutters of dark slides pull right out.

Remarks.—Mr. Brooker certainly deserves credit for the endeavour to make a hand camera possess all the features of an ordinary one, with the addition of its own compactness and portability.

Prices, without lens, but with three double slides—

¼ pl.	½ pl.
£6 6 0	£9 9 0

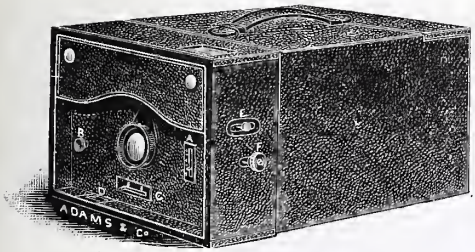


Fig. 1. No. 66.

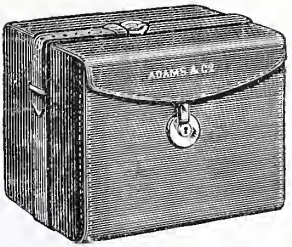


Fig. 2.

66.—**The "Adams"** (Adams & Co.)

Features.—Bag changer. Removal reservoir. Adaptable for films.

Description.—Though in its general principle and outline this 1892 instrument is like that described on page 287 Phot. An., 1891, yet there are so many alterations and improvements that the easiest way will be to describe the present one. In its ordinary form it has a changing box, on the bag system, for 12 plates, and it weighs complete $4\frac{1}{2}$lbs. Its principal features may he described as those of great portability, simplicity, and powers afforded. The portahility is secured by making one part slide within the other in order to close it up, so that for carrying purposes it measures only $6\frac{7}{8} \times 6\frac{1}{4} \times 5\frac{3}{8}$. To get it ready for use, two lids are opened in front, a slight pull bringing out the sliding part, which contains lens, shutter and finders. When closed, therefore, all these parts, and the necessary apertures for them, are covered up, so that the case is absolutely plain outside. This is a point in connection with secrecy that is thoroughly carried out. There is nothing about the "Adams," when closed, to identify it as a camera. In use, however, it is rather the other way, though not to such a marked degree as some. The length is increased to $9\frac{1}{2}$ inches, and the lens and part of the shutter adjustment are in view. A special feature of this camera is that, owing to the size of the changing box, the fitting of the roll holder is an easy matter, so that it is described as being "interchangeable with a roll holder," and this is accomplished without the addition of any frame or alteration of any part. The shutter is one of Newman's, working between the combinations, fitted with the patent regulation pneumatic brake, giving powers of exposure between $\frac{1}{100}$th and $\frac{1}{2}$ second. The lens is covered automatically by a sheath, so that there are really two shutters to protect the plate from the light. When the discharger is pressed, this sheath first uncovers the lens, and as soon as the aperture is clear the shutter fires; when released, the sheath falls back again. In this way considerable protection from stray light is obtained, and the shutter of the changing box can safely be taken out altogether until it is desired to remove the plate reservoir hodily. The lens is a 5×4 Rapid Symmetrical, by Ross & Co., and focussing is arranged for and registered upon a scale from two yards to any distance. The removable plate-holder allows a focussing screen to be hrought into use when required, and through a small aperture at the back, with the lid down, the image is sufficiently hrilliant to dispense entirely with a focussing cloth. Fig. 1 shows the camera open ready for use, and fig. 2 its appearance ready for travelling.

The hag changing hox has been greatly improved. The raising lever is now at the back and *in the centre,* and an indicator to show the number of plates exposed is attached. For memorandums of exposures a tablet is affixed inside the lid (see fig. 3).

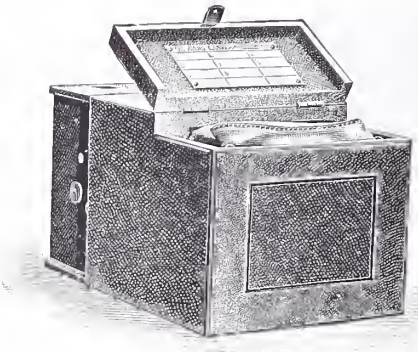


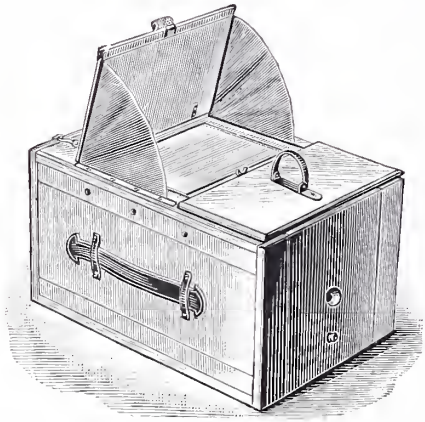
Fig. 3. No. 66.

Remarks.—I can add but little to my notice of it in the Hand Camera articles in *Photography*. It is a grand instrument, and even if the price is too high for many of us, yet those who can afford it will not only get their money's worth, but a camera that is capable of the very best work.

Prices, in case, with one changing box—

½ pl.	5 × 4
£15 15 0	£18 18 0

Extras.—Changing boxes, each 45s. and 63s.; roll holders, 47s. 6d. and 57s. 6d.



No. 67. Fig. 1.

67.—**The "Delta"** (Marion & Co.)

Features.—Special bag chamber, full size finder.

Details.—The usual changing bag is replaced in the "Delta" by a leather bellows, light-tight, and shaped so as not to be likely to get torn or out of order. This bellows has a flat wooden top, grooved inside, and a round hole large enough to allow two fingers to enter and lay hold of the plate, which is below and protected by a light-tight cloth. The perfect control makes the changing of the plate to be a matter of ease.

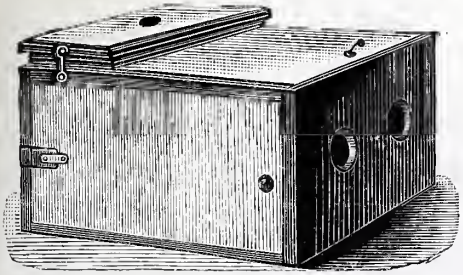


Fig. 2. No. 67.

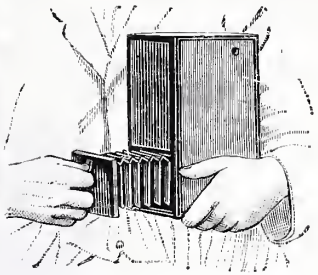


Fig. 3.

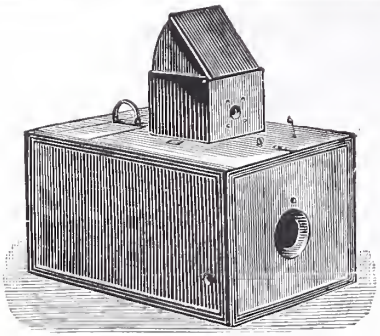
The method of working is as follows:—To open the camera (see fig. 2) the springs over the hinges are undone, and the back lid taken off. All the plates being fitted into the sheaths emulsion side upwards, the skeleton sheath is then inserted, the bent part at bottom and facing in front; the sheaths one by one are now placed in behind it; when all of them are in, the lid is fixed, and the hinges fastened with the springs over them.

To put a plate in position, the button is moved to the top of the slot. Thereby a sheath is raised, and can be taken hold of by the forefinger and thumb (of course, the sheath is protected by the cloth). The hook which keeps the bellows flat is undone so that the bellows may be stretched to its height. The sheath being held by the finger and thumb, rises with the bellows until it is felt to be above the metal plates at the side. Then in pushing the sheath obliquely forward it touches the rabbet, and can then be descended into its proper position ready for exposure. The bellows at first is bent obliquely backward to permit the sheath being pushed obliquely forward. As the sheath descends so does the bellows, and when quite down the hinges are fastened. During exposure the button (No. 3) must be put to the bottom of the slot. The shutter is set by pulling the bead at end of string No. 5, and is fired by pulling the bead No. 6 (this is for an instantaneous exposure). When all the plates have been exposed the button may be pushed up, but it does not then raise a sheath, for the skeleton sheath now occupies the last place. The lens is a rectilinear, giving objects all sharp at 13 feet with the small size, and about 25 feet with the larger size. The shutter for time exposures is merely held back by the string and let go when completed. The Alidade finder (only for the small size) is a wooden frame mounted on hinges. The aperture or opening gives the exact field covered by the lens, and consequently the view obtained on the plate. The wide margins hide the landscape beyond the optical angle, so that it is easy to judge if the view given by the finder will make an effective photograph. To use the finder the camera is put to the face in such a manner that the visnal ray or line of sight falls where the threads meet and the top of the brass pointer is visible. (The brass pointer is placed above the lens and pivotted, so it occupies little space.) The finder is without prism or ground glass, and has the advantage of being useable by persons of weak sight, also it does not reverse the image. Both size cameras are supplied with small finders to be put on top of the apparatus, and to be used for vertical and horizontal views. These small finders can, if desired, also be applied to the small size cameras instead of the Alidade finder.

Remarks.—These are foreign cameras and for foreign sizes, viz.—9c. × 12c. ($4\frac{3}{4} \times 3\frac{1}{2}$), and 13c. × 18c. ($7\frac{1}{16} \times 5\frac{1}{8}$). The sizes and weights are, loaded with 12 plates—

	Size.	Weight.
Small	$9 \times 5\frac{7}{8} \times 4\frac{3}{8}$ ..	4 lbs. 14 ozs.
Large	$11\frac{3}{8} \times 8\frac{1}{4} \times 5\frac{7}{8}$ ..	9 „ 14 „

Prices.—Small, £3 3s.; large, £5 5s.



No. 68. Fig. 1.

68.—The "Normal Simplex" (Marion & Co.)

Features.—Lever movement.

Details.—Possibly the instructions for working will give the clearest idea. To open the camera: Raise the German silver spring, and move the D shaped handle towards the left until it is in a straight line. To fill and to empty the camera: Let all the sheaths be filled with the plates, emulsion side upwards, then place them one by one into the camera (see the drawing). Whilst the camera is being filled, it should stand lens side downwards, and each sheath is put in emulsion side downwards, the bent end going in first. When the 12 sheaths are in, the flat piece of wood is inserted between the springs and the sheaths. It is preferable to put the sheaths in the camera according to their consecutive numbers. Now put on the lid and replace the spring.

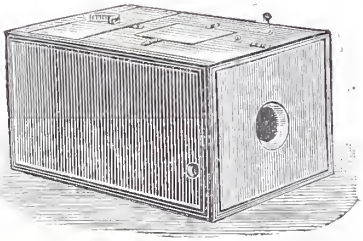


Fig. 2. No. 68.

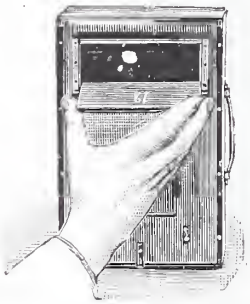


Fig. 3.

The camera must always have the full 12 sheaths in it, otherwise the mechanism for changing the plates will not act.

To withdraw the sheaths, place the camera lens downwards, and use the flat piece of brass, the bent end catches the sheath, and it can then be removed easily. Note when only a portion of the plates have been exposed—those behind the piece of wood will be the exposed ones, and those in front the non-exposed—if the piece of wood is quite in front then all the plates will have been exposed.

Changing the plates or sheaths: During this operation the lens should point upwards, and the bellows should be drawn out horizontally (see the drawing). The camera is held against the body with the left hand, whilst with the right the bellows is pulled out, and then the plate will be heard, in fact, felt to fall. The bellows should be drawn out as far as it will go;

if one can push it back immediately it is a sign that the plate has been properly changed; in fact, the changing of plates is effected by drawing fully out the bellows and pushing it home again. After the change is effected be sure and button the lid of bellows so that it cannot come out by itself.

Method of avoiding a double exposure: Should it happen that a plate has been exposed and not removed, the instantaneous shutter cannot be set—that is to say, the string attached to the bead cannot be pulled out—thus no injury arises from the omission; the plate being changed, the shutter can be set and the exposure of the next unexposed plate proceeded with. When all the plates have been exposed, the bellows cannot be drawn out, because the piece of wood that was at the bottom is now at the top, and its thickness prevents its passing.

If by accident the string that sets the shutter should slip through the fingers, so the shutter cannot act, it can be remedied by just drawing out the bellows a little way—but be particular only a little way—and then pushing it back again.

To change the speed of the shutter and of the lens: In opening the front of the camera, the adjustment for shutter for lens and diaphragms can easily be made. The rapidity of the shutter is increased by pushing toward the right the button which is found on the top inside the camera. The lens is moved backwards or forwards by the brass handle; when pushed home (its normal position), all objects at 38 feet and beyond will be sharp on the plate; if brought out till the spring catches in the notch, (medium position), objects from 16 to 31 feet are sharp. If the lens is brought right out the objects from 6 feet to 10 feet will be sharp. This applies to the 9c. × 12c. size only. In the camera 13c. × 18c. and 9c. × 18c. the rapidity of shutter is increased by sliding from left to right the handle which is under the lens inside the camera.

The finder is situated in the body of the camera, and springs up when the metal cross bar is turned straight; it is better to restrain it a little or it will spring up with too much force.

The metal frame which is on the ground glass serves to give the correct view for oblong pictures, and is shifted to the upright way for upright pictures, and also the box of the finder for upright views is shifted to the side of the camera, where are found two screw heads.

The sheaths: The sheaths that carry the dry plates should be carefully handled so as to avoid any bending of the back or edges—they are arched up a little in the centre so that when the plate is slid in the sheath binds on to it and prevents the plates from slipping out. Never try to force a very thick plate in a sheath, nor attempt to enlarge a sheath, for to work the changing easily the sheaths must all be regular.

To see the number of the sheath: All the sheaths are numbered on the back, and by turning to the right the little button at the back of the camera, the number of the sheath last exposed can be seen through the little hole.

Remarks.—This is also a foreign camera, made in the same sizes as the "Delta," No. 67.

Prices and details.—The weight is when loaded—

$4\frac{3}{4} \times 3\frac{1}{2}$in.	..	$9\frac{3}{4} \times 6\frac{1}{4} \times 5$	..	6lb. 10oz.	..	£8	8	0
$7\frac{1}{16} \times 5\frac{1}{8}$in.	..	$11\frac{3}{4} \times 8\frac{1}{4} \times 6\frac{3}{4}$	..	11lb.	..	£14	3	0

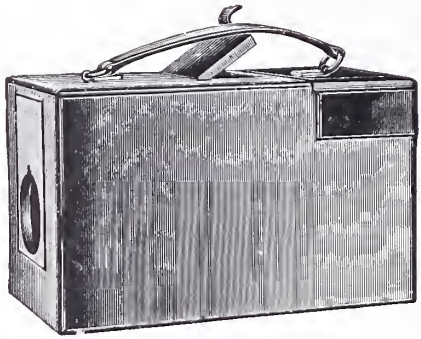
69.—**Miller's Stereoscopic** (T. Miller).

Features.—Automatic changer. Well system.

Details.—This camera is built on exactly the same lines as the "Adelphi." (Page 313 Phot. An., 1891.) The method is simplicity itself. By one movement of the lever on the top of the camera, the exposed plate, which is in a sheath, is released, and at the same time, by an ingenious device, the partition between the lenses is removed, allowing the plate to fall clear

and on to an inclined plane or platform, from which it slides into the well underneath, leaving the next plate in position ready for exposure.

Price £7 10s.



No. 70.

70.—**The "Vanneck"** (Watson & Sons).

Features.—Reflector principle. Roll holder.

Description.—This camera was dealt with on page 312 Phot. An., 1891, but this season has produced a new size, and a smaller one, viz., for 3¼ square plates, and arranged also that a roll holder for the same size picture can be used.

Prices of the new size, 3¼ square—

For plates	£9	10	0
With roll holder only	10	0	0

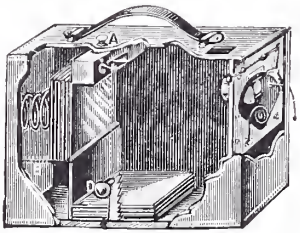


Fig. 1

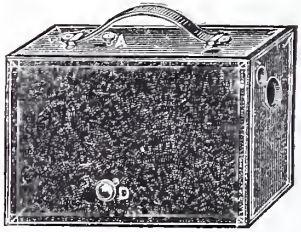


Fig. 2.

71.—**The "Cytox"** (P. Harris & Co.)

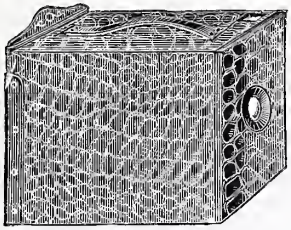
Features.—Well system.

Description.—The sheaths have short wires at the end, which travel in grooves. Fig 1 shows very clearly the method of changing. In their normal positions the sheaths rest against a piece of wood across the top, but when a button is pushed the sheath is pressed down sufficiently to clear the obstruction, and falls into the well underneath. There is an ingenious spring, with grooved attachment inside, worked by a screw from the outside, which keeps the plates tight in the well and prevents them from shaking about. The lens is a single one, with an ingeniously contrived diaphragm on the Iris principle, worked from the front. The shutter, which has the brass shield to keep the lens aperture always covered, is of ebonite. Time exposures may be given. The case is of ebonised and polished mahogany, and the usual two finders are fitted.

Remarks.—Very simple in action, and I consider it a clever thing.

Price £3 3s.

Extra, for leather covering, 7s. 6d.



No. 72.

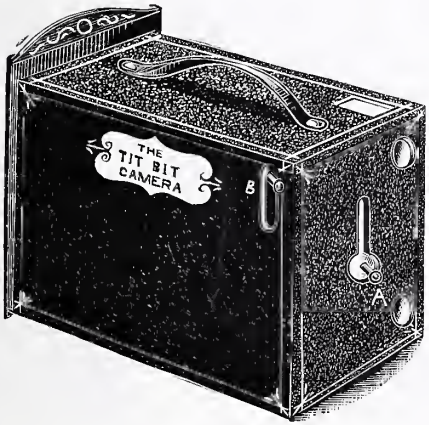
72.—**The "Crocodile"** (W. Tylar).

Features.—Dark slides. Neatness in size.

Description.—The name arises from the covering of crocodile leather. It is at once small, light, compact, useful and durable. It has a fixed focus lens of good covering power, with finders for horizontal and vertical pictures, and a sling canvas case of 12 single metal slides. Its size is only $5\frac{3}{4} \times 4\frac{1}{2} \times 5\frac{1}{4}$.

Remarks.—Just the thing for the fair sex.

Price £2.



No. 73.

73.—**The "Tit Bits"** (W. Tylar).

Features.—Metal body, dark slides.

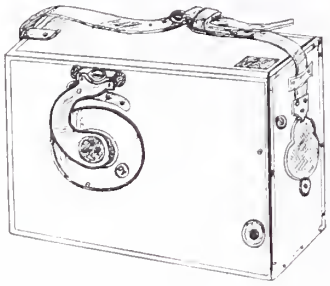
Description.—This is something of a new departure, being made entirely of thin sheet metal, covered with a casing of leather. It is even smaller than No. 72, and is very neat and light. The shutter is of the drop form, set at A, and released from the outside at B, without any doors to open or shut. It is so made that at any time the covering gets soiled or damaged a fresh one can be attached by its owner at a trifling cost, or the buyer of a cloth covered one can as his funds increase substitute a leather one. Its size is $5\frac{1}{2} \times 4\frac{1}{4} \times 5$.

Remarks.—This camera ought to defy damp and heat.

Prices, without finders, cloth covered, and six single metal slides, £1.

Extras.—Finders, 4s. Leather covering, 4s. Recovers of cloth 2s., or of leather 4s., will be supplied. These can be attached by anyone, so the

camera can always be renovated when needed. Coverings are of several colours—black, marone, imitation lizard skin or crocodile—so all tastes can be suited.



No. 74.

74.—**The "Frena"** (London Stereo Co.)

Features.—For cut films.

Description.—This is designed for use with celluloid films in cut sizes, and is quite novel in its working arrangements. The reservoir is filled with any number of films up to forty, each being separated from the other by a thin opaque card. A very ingenious arrangement, actuated by a handle at the side, allows a film and its accompanying card to fall into a second reservoir in the bottom of the camera. The working is remarkably simple, each exposure necessitating only one movement of the side lever, and the turning of a knob to set the shutter. A novel feature is the introduction of a spirit level into the top of the changing lever, so that no matter how much the camera has to be tilted, the film can be adjusted to an absolutely vertical position. The regulation of the speed of the shutter is done by varying the size of the opening, the strength of the spring remaining unaltered. The lens is one of Beck's R R.'s, working at f/11.

Price £5 5s.

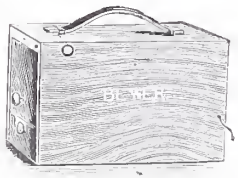


Fig. 1.



Fig. 2.

No. 75.

75.—**The "Beyer"** (W. Beyer).

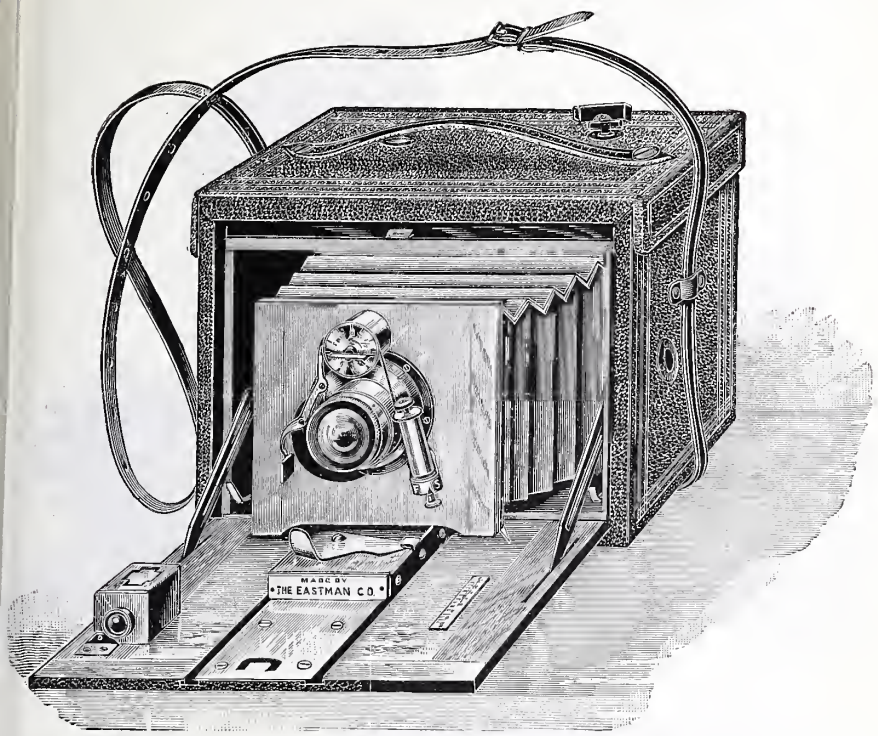
Features.—Well system.

Description.—The No. 1 and No. 2 differ from each other only in the method of changing. In the No. 1 the plates (which are in sheaths) are released by a cog wheel into which the tops of sheaths work. A spring brake indicates by a slight click that the plate is released. In the No. 2, the sheaths are a little different, and the cog wheel is replaced by a button, which releases the sheaths by alternately turning it left and right. The lenses have a fixed focus at 12 feet, and the shutter is an everset pattern. The case is of mahogany.

Prices, for either pattern—

$3\frac{1}{4} \times 3\frac{1}{4}$	$\frac{1}{4}$ pl.
£1 5 0	£1 10 0

Extra.—R.R. lens, 15s. and 10s.



No. 76. Fig. 1.

76.—**The "Kodak"** (The Eastman Co.)

Features.—New patterns.

Details.—This is really an improved No. 5 folding Kodak, the No. 4 being improved the same way. The improvements are that of being able to use ordinary plates, and a new frictionless shutter, automatically adjustable for time and instantaneous exposures. The roller slide is now so arranged that it can be removed in daylight, and what is called the "glass plate attachment" substituted. Fig. 1 gives a good idea of the shutter, and fig. 2 the special attachment.

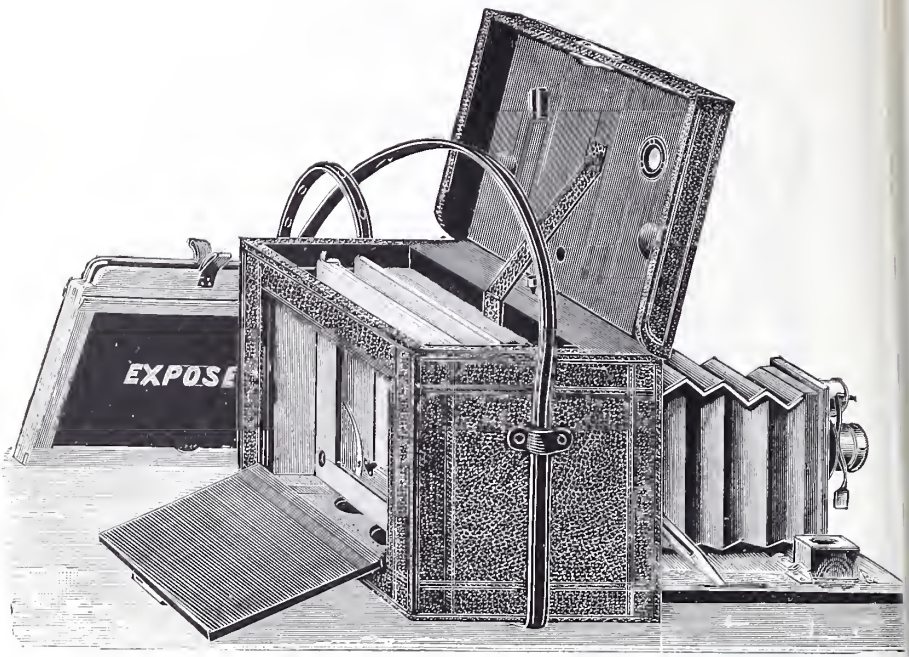
Remarks.—The additions are a very great improvement, because there are occasions when perhaps the most enthusiastic film worker would like to be able to use plates. The shutter is a perfect gem.

Prices are increased slightly—

No. 4—£11 7 6 No. 5—£13 7 6

Extras.—The glass plate attachment is not included in the above prices. The outfit consists of adapter and focussing glass, three double plate holders, and leather carrying case.

No. 4—£1 13 0 No. 5—£1 19 6



No. 76. Fig. 2.

77.—**The Roberts 1891** (W. C. Roberts).

Features.—Magazine, grooved reservoir.

Details.—In this pattern a grooved reservoir travels over an opening into which the plate drops as required. The plates are inserted in the grooves without sheaths, and the reservoir is moved by a rackwork and milled head. A spring catch prevents the moving of the reservoir except when required. One feature about this camera is that to move the reservoir it is necessary to turn the case upside down, as, otherwise, the edges of the plate would catch as they passed along. The great advantage, however, is obtained of being able to focus direct upon a ground glass screen, which is one other grooved reservoirs do not give. This is managed very simply by closing the opening where the plate drops by a sliding metal lid, moved by a small button from the outside. When the plate is back in the reservoir in its proper groove, this lid is pushed home, and thus the plates are absolutely safe. A small door at the bottom being opened, a full-sized focus screen is revealed, which can be utilised either for time work, composition of the subject, or a verification of the distance. This screen also serves another purpose, that of pushing the plate home to correct register, and keeping it there during exposure. It also prevents any other plate dropping, should the reservoir be accidentally moved before the return of the dropped plate to its proper groove. And, finally, it is an additional covering to the opening, so that the light admitted to the plate during exposure interferes in no wise with the plates in the reservoir Two finders are fitted, both well sunk down, and two spirit levels. The latter can only

be useful on rare occasions, such as time exposures upon architectural subjects, as watching two levels in opposite directions, to say nothing of getting them correct, is really out of the question with anything like quick work.

Remarks.—The features of the "Roberts" are, of course, the power afforded by the focussing screen, and also that of being able to use any plate required. As the reservoir has to travel when the camera is upside down, the plates do not move at all until it is turned over again, and so any particular plate can be brought over the opening. The maker advertises his camera without a lens, either fitting any special one desired, or the one his customer possesses. The shutter is a blind one, working either in front or behind the lens as ordered, but usually behind. A focussing scale is provided underneath with a rackwork adjustment and indicator. Altogether the "Roberts" appears to me—and I have thoroughly experimented with it—a very good thing. The only drawback is the turning over.

Price £3 3s.



No. 78.

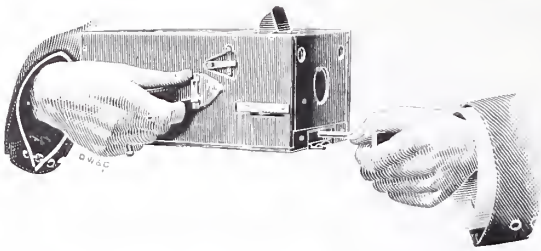
78.—**The Twin Lens, "Artist"** (London Stereo Co)

Features.—Twin lens principle.

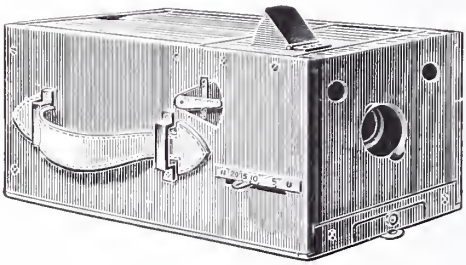
Description.—See Phot. An., 1891, page 309.

Remarks.—This has been improved this season by the addition of a roller blind shutter, with outside speed indicator. There are two separate releases to the shutter for time and instantaneous exposures respectively. The hood of the finder has also been improved, so that the picture can be clearly seen even in the brightest sunlight.

Prices—¼ pl., £15 15s.



No. 79. Fig. 1.



No. 79. Fig. 2.

79.—**The "Shuttle"** (Houghton & Son).

Features.—Rod and lever movement changer.

Description.—This is quite a recent introduction, and though somewhat like their "Automatic" of last year as regards the movement required to change the plate, it is different in detail. It comes into the market with one especial recommendation, that of its very small dimensions. The ¼-plate size camera measures externally 9½ x 5¼ x 4½, and weighs three pounds only (without plates). The method of changing is extremely simple, as will be clearly seen in fig. 1. A brass rod is pulled out at the front, which not only brings forward a fresh plate, but sets the shutter as well. The rod is then pushed home to bring the plate right in front of the others and in correct register. Sheaths of the usual pattern are used. Focussing is accomplished by a lever, working across an index plate, with distances of 5, 10, 20, and 30 feet; beyond the latter the focus is fixed. The usual two finders, with good covering hoods, are provided. The lens is, of course, a good rapid rectilinear.

Remarks.—The movement, so far as I have tried it, works very smoothly and satisfactorily, and in principle is something like a weaving shuttle, hence the name, and is very quickly done, a very desirable feature. The "Shuttle" will, I think, command attention in the future.

Prices.—In mahogany, £7 ; in morocco leather, £7 12s. 6d.

Extras.—Lenses by Wray, 21/- ; Taylor, 25/- ; Ross, 57/6.

80.—**The "Popular" No. 0** (E. A. King).

Features.—Dark slides.

Details.—A plain but well made camera with three metal double backs achromatic view lens, and instantaneous shutter. Excellent value for the money.

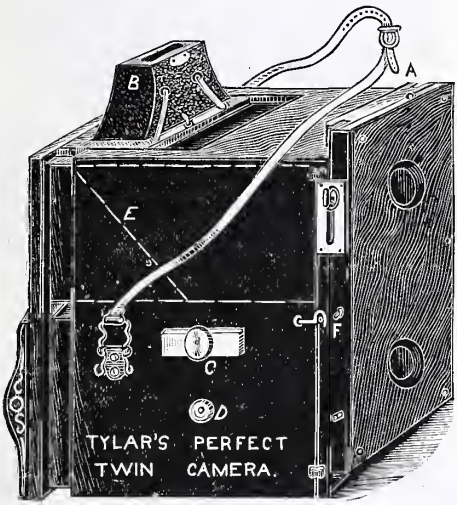
Prices—¼ pl., 10/6 ; ½ pl., 21/-

81.—The "Popular" No. 1 (E. A. King).

Features.—Magazine or lever movement changing.

Details.—The changing is accomplished very simply. The plates are pressed forward in the magazine, which occupies the upper half of the box, and when exposed are pushed down to the lower half by a lever. Made in Spanish mahogany, measures 10 × 7½ × 4⅞ inches, and weighs 4lbs. The shutter is a disc pattern for either time or instantaneous exposures. The ordinary single combination lens is fitted.

Price 25/-



No. 82.

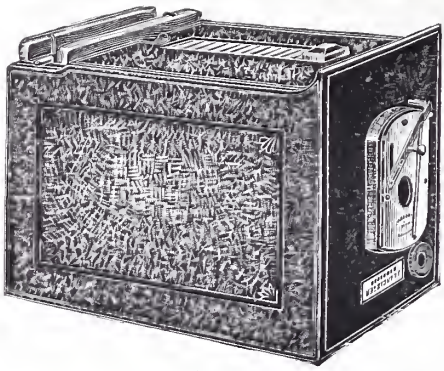
82.—The "Twin Perfect" (W. Tylar).

Features.—Full size finder, focussing up to moment of exposure, rising front, metal dark slides or roll-holder, or both.

Description.—This is a double camera of the detective type, giving an image on the finder the full size and identical with that on the plate in all its details It has a range of focus of 4½ to 6 inches; the focussing is performed by means of a milled head at the side of the camera, and an object can be followed and focussed right up to the moment of exposure, which is quickly effected by pressing a button at the side of the camera, close to the milled head of the rack and pinion. The shutter is set by pulling a small knob at the top of the camera, which flies automatically back as soon as the shutter is set. The camera has every motion necessary, including a rising front, a thing often needed in the hand camera, and until lately little studied. The difficulty of clearly discerning the image on the finder has been overcome by the adaptation of one of Tylar's focussing chambers, which has the further advantage of protecting the ground glass top of the finder when not in use. The camera is sent out either in polished mahogany or ebonised, as preferred, and with any maker's lenses attached to suit the wishes of purchasers. A case of 12 single metal slides to carry over the shoulder is supplied, or those who wish to have a roll-holder attached can be accommodated.

Remarks.—A very convenient and accommodating instrument. Like most other goods emanating from Mr. Tylar, it is reasonable in price and of good workmanship. Size, 8½ × 5½ × 7¼ inches.

Price—Not yet fixed.



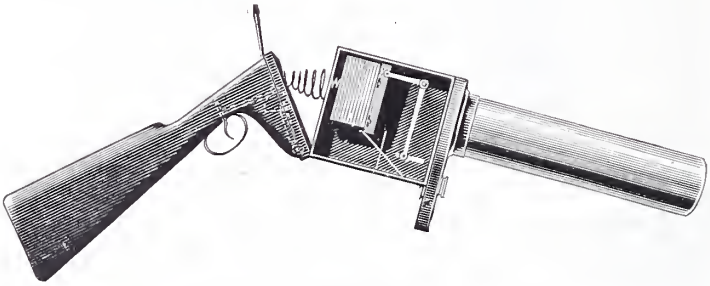
No. 83.

83.—**The New "Omnigraph"** (Lancaster & Son).

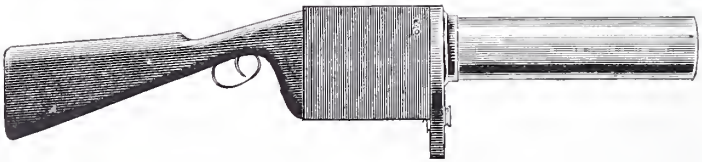
Features.—Changing box.

Details.—This is an improved make of the one described on page 326 Phot. An., 1891. It has good single lens with adjustable diaphragms and shutter. Leather covered.

Price £1 11s. 6d.



No. 84. Fig. 1.



No. 84. Fig. 2.

84.—**The "Clifford" Gun** (C. Lawrance).

Details.—I have not seen this new camera, but from the patent specification it appears likely to work satisfactorily. It is, of course, for photographing birds on the wing or other moving objects at a distance; being a long focus lens it gives a good-sized image of distant objects. The shutter is self-setting, and when wound up it is capable of giving six or more exposures. The firing of shutter is done by pulling the trigger, and the size of plate is $3\frac{1}{4} \times 3\frac{1}{4}$. The changing of the plate is a modified system of that adopted in the "Clifford" hand camera, No. 62.

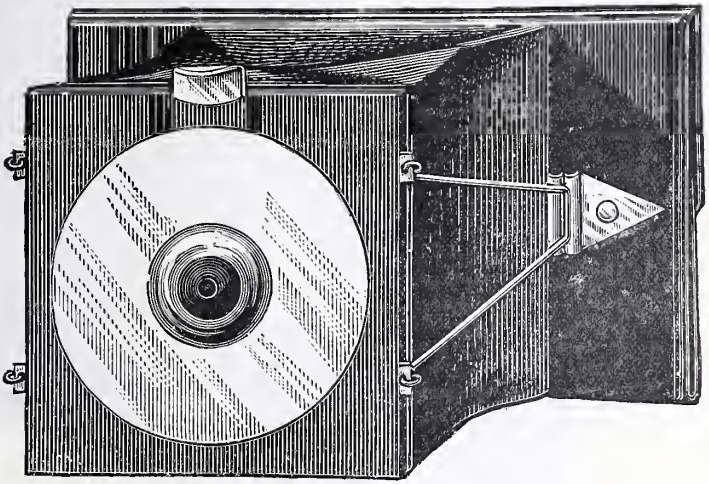
85.—**The Roberts 1892** (W. C. Roberts).

Features.—Changing similar to No. 77.

Details.—This is a magazine camera carrying 12 plates, each automatically registered. It is fitted with two well sunk finders for vertical and horizontal pictures. The shutter is for time and instantaneous exposures and always set. It is fitted with a good 5 x 4 R.R. lens of 5½in. focus. The lens focussing arrangement is quite unique, and works on the top of camera at the side of finder. There are only two movements. It is well got up with leather handle on top for carrying.

Remarks.—Certainly at the price this is good value and ought to succeed.

Price £3 10s.



No. 86. Fig. 1.

86.—**The "Purse"** (Blackfriars Photo Co.)

Features.—Small plates used. Goes into an ordinary purse.

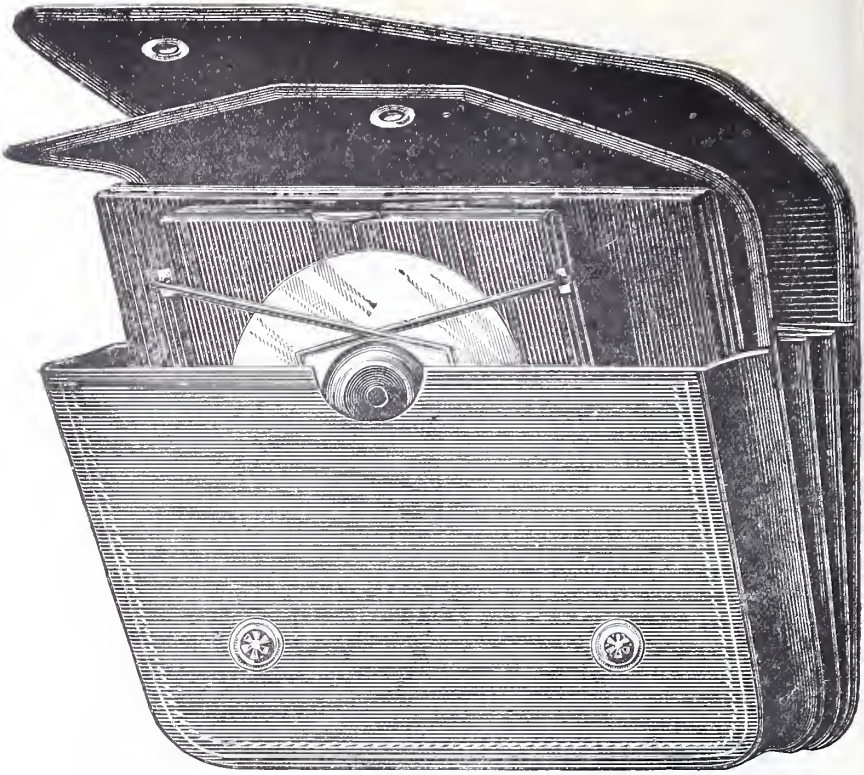
Details.—Fig. 1 shows the camera itself, which is, of course, very tiny. By means of two wire supports, it opens out and becomes rigid, as shown in the illustration. A tiny sliding metal shutter can be used for the exposure, but probably a better way would be to use the finger over the aperture. There is no dark slide, the plate being kept secure from light by a series of flaps at the back. The plate used measures two inches square.

Fig. 2 shows the purse itself, which is made of very good quality leather. The camera fits in the front compartment, whilst behind are places for such money as the owner be possessed of, and one for visiting cards.

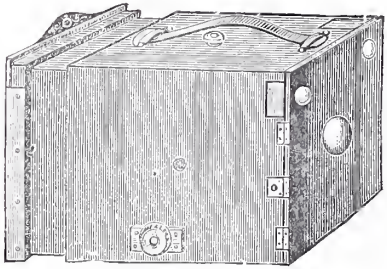
Remarks.—Considering the very moderate price, the purse alone being worth at least half of the sum, it is really well made and ingenious.

Price of purse and camera complete, 6/-.

A neat box containing an outfit consisting of a developing lamp (tin), plates, printing frame, paper, and developers, 4/6.



No. 86. Fig. 2.



No. 87.

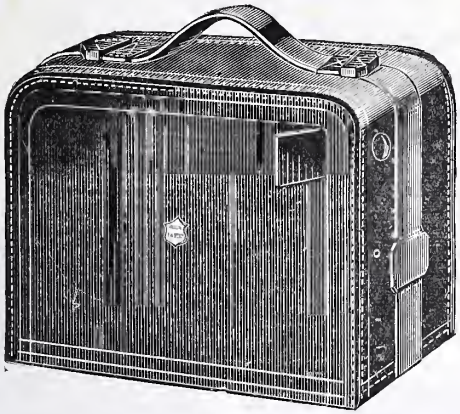
87.—**The "Perfect"** (W. Tylar).

Features.—Use of different lenses.

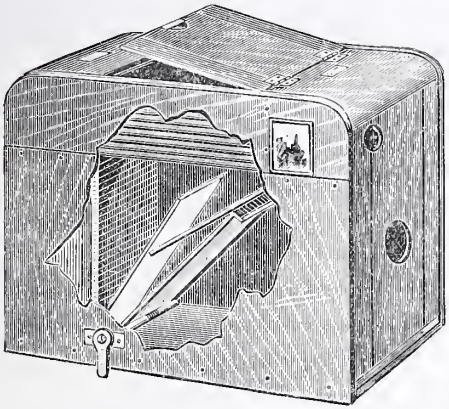
Description.—This is of similar general construction to the "Twin Perfect" only without the large finder. One or more lenses can be used with it of different foci. The lens always remains at the same distance from the shutter. It has two small finders, one for vertical and the other

for horizontal pictures. It can be used on a stand, and instantaneous or cap exposures given at will. It is well-made and finished, either ebonised or polished mahogany as preferred, and can be fitted with a roll holder if desired. The camera is carried in the hand, the case of 12 single metal slides over the shoulder. Its size is $7\frac{1}{2} \times 5\frac{3}{4} \times 4\frac{3}{4}$.

Price, fitted to customer's lens, 50s.; supplied with single instantaneous lens, working f/8, £3; or with R.R. lens of good quality, £4 10s.



No. 88. Fig. 1.



No. 88. Fig. 2.

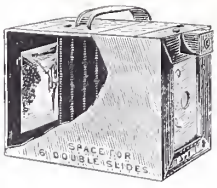
88.—**The "Rover" 1892** (Lancaster & Son).

Features.—Lever movement, automatic changer.

Details.—See page 336 Phot. An., 1891. It has been much improved in construction, and the exterior shape quite altered. Fig. 2 shows the interior of camera, and fig. 1 the travelling case.

Prices, which include the case and straps—

$3\frac{1}{4} \times 3\frac{1}{4}$	$\frac{1}{4}$ pl.	5×4	$\frac{1}{2}$ pl.	$7\frac{1}{2} \times 5$
£2 12 6	£3 3 0	£4 4 0	£5 5 0	£6 6 0



No. 89.

89.—**The "Ubique"** (Perken, Son & Rayment).

Features.—Dark slides.

Description.—A neat, compact, and plain little camera, with a shutter adjustable to different speeds, view finder, and focussing screen. It measures $8 \times 4\frac{1}{2} \times 6$, and provides room for the three dark slides which accompany it. Made in mahogany or covered with leather.

Prices—With rapid view lens, 55/-
With R.R. lens, 80/-

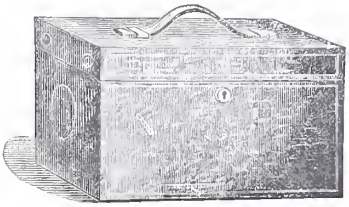
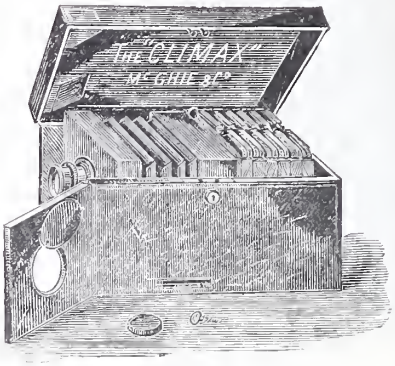


Fig. 1.



No. 90. Fig. 2.

90.—**The "Climax"** (McGhie & Co.)

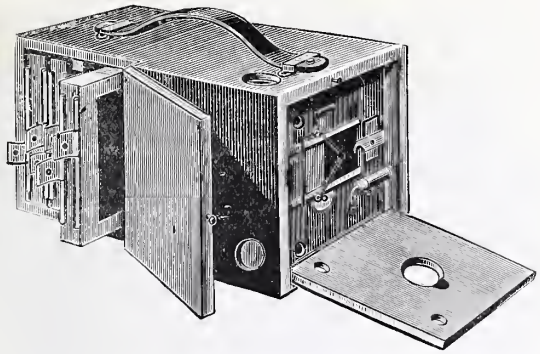
Features.—Dark slides.

Details.—A plain, box-form hand camera, measuring for $\frac{1}{4}$ plates—length, 10in.; breadth, $4\frac{3}{4}$in.; and height, 6in.; weighs, without slides, 3lbs., and with six double slides and focussing screen, &c., $4\frac{1}{2}$lbs. It is fitted with a rapid rectilinear lens, with diaphragms. Behind the lens is an improved shutter, which opens and closes from the centre, and has regulation of speed. Two sunk view-finders (one for vertical and one for horizontal pictures). Lever adjustment for focussing (outside of camera) indicated from two to 25 yards. Six *double* dark slides of an improved pattern, which lie flat together inside the case. A focussing screen and tripod screw is also supplied, so that when not required for hand use it can be screwed on to a tripod and used as an ordinary camera. When the slides are removed from the rear compartment it forms a focussing chamber, which dispenses with the use of a focussing cloth.

Remarks.—Very compact, considering that no less than six double dark slides are provided for.

Price £5 15s.

Extras.—Eastman roll-holder and four double slides instead of the six, £2 3s. 6d.; lenses, with Iris diaphragm, by Wray, 45/-; Beck, 50/-; Taylor, 57/-



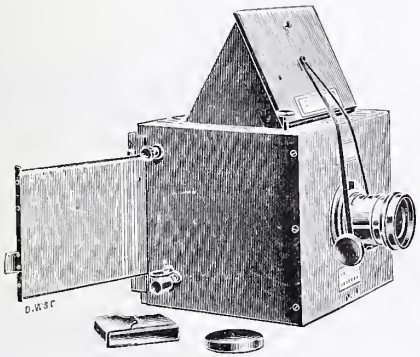
No. 91.

91.—The "Two Guinea" (W. Griffiths & Co.)

Features.—Dark slides.

Description.—This is similar to those described on page 302 Phot. An. 1891, but is altogether superior both in style and finish.

Prices—¼ pl., £2 2s.; 5 × 4, £2 12s. 6d.



No. 92.

92.—The "Reflex" (Loman & Co.)

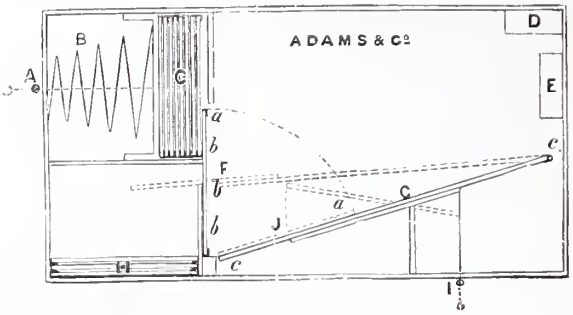
Features.—Reflector principle.

Details.—This camera has been much improved in construction since the 1891 Photography Annual (page 314) appeared. The shutter release is now not only easier in action, but appears to lift the mirror and fire the shutter much more efficiently. In addition to several new Continental sizes, a new English size has been introduced, viz., 5 × 4.

Remarks.—The firm mean business, for they have lately put down a lot of machinery, American and English, with special steam power, to increase their capabilities of output. The "Reflex" is going to be one of the leading hand-cameras ere long, and I venture to prophesy that the future will find t in the front rank as regards number of users even in this country.

Prices—

	¼ pl.	5 × 4	½ pl.
One double slide	£8 15 0	£12 10 0	£17 10 0
Three ,, ,,	10 0 0	13 15 0	15 16 8



No. 93.

93.—**The "Otto"** (Adams & Co.)

Features.—Well system.

Description.—The method of changing may be seen by the illustration, as follows:—B is a spiral spring which presses forward the plates (in sheaths) into correct focal register. When it is desired to change a plate the button A at the back is pulled, which allows the front one to fall face downwards upon the plane G. Another string is actuated by I underneath, which allows the plate to fall into the store chamber. H represents the plate so stored. The dotted lines show the action pretty clearly. The camera measures 11 × 5 × 6, and weighs complete and loaded with 12 plates, 4 lbs. The case is of mahogany, covered with black imitation morocco leather. The lens is a single combination one, working at f/11, and at fixed focus. The usual two finders are fitted. There is a door at the side, so that the whole of the inside can be got at, to remove the lens for cleaning or any other purposes.

Remarks.—Very simple in action, and works extremely smoothly.

Price £2 10s.

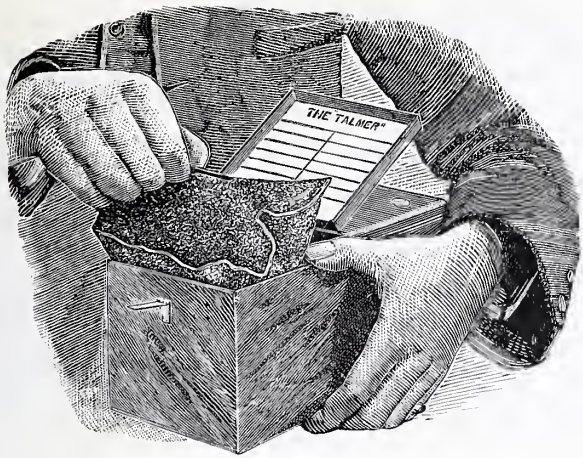
94.—**The "Vesta"** (Adams & Co.)

Features.—Very small, for the pocket.

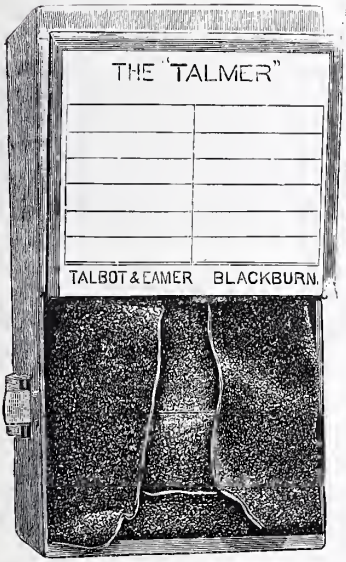
Description.—By means of an ingenious arrangement of the lens, this camera is made very small indeed. The lens and shutter are attached to a metal arm. When the camera is packed this folds on the *top*, and therefore the lens merely adds to the dimensions from the top to the bottom, *i.e.*, the depth of the pocket is concerned, not the width or capacity. This is an important feature. The "Vesta" is made for ¼ plates, and is, when packed, complete with dark slide, lens, shutter, focussing screen, and finder. The lens is one of Wray's, and will focus from four yards to any distance. The ground glass is always in position, and by removing the dark slide may be used for focussing immediately; but, if it is not required to be used in this way, the focus is marked on a scale that can be readily seen. It can be used on a tripod in the usual manner. The shutter is provided with Newman's patent pneumatic regulation, giving exposures as slow as a ¼ sec., and cap exposures may be given at will. When folded for the pocket, it contains everything *in situ*, including a dark slide. It can be set up in a few seconds, and is then ready for use. It has a swing-back for upright pictures, therefore architectural subjects may be photographed without distortion.

Remarks.—Very ingenious, and I believe quite the smallest hand camera made for full-size ¼ plates, which may be gleaned from the fact that when folded it measures, lens, focussing glass, and dark slide, 7½ × 4½ × 1½ inches, and weighs 17 oz.

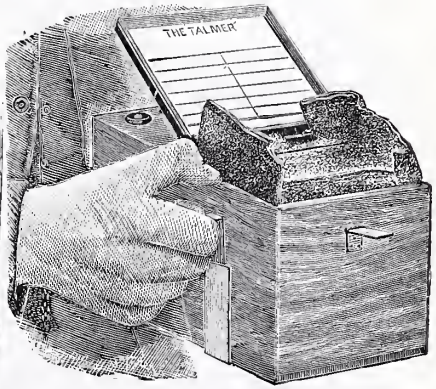
Price, in leather case, with three double slides, £7 7s.



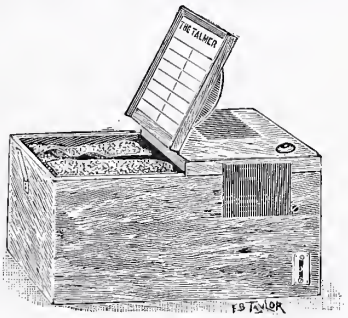
No 95. Fig 1.



No. 95. Fig. 2.



No. 95. Fig. 3.



No. 95. Fig 4.

95.—**The "Talmer"** (Talbot & Eamer).

Features.—Bag changer.

Description.—See Phot. An. 1891, page 329. The 1892 pattern is now fitted with a Euryscope lens, working with full aperture f/6, and has a focussing arrangement from 20 feet (at which it becomes fixed) down to 8 feet. It has also been very much improved in many ways. The finders are considerably larger, and have spring covering hoods; the one sent me has a ground glass, $1\frac{3}{4} \times 1\frac{3}{8}$, which is a really good size. The spring release to the hoods is very comfortable to work. The lens, too, is provided with an Iris diaphragm moved from underneath, and registering upon a brass plate.

Remarks.—The "Talmer" ought to make its mark, as the various movements and conveniences are wonderfully ingenious.

Price £7 10s.

96.—**The "Arcanum"** (Talbot & Eamer)

Features.—Bag changer. Cheapness.

Description.—This is really a cheaper form of "Talmer," though running under a distinctive title, and is quite a recent introduction. It possesses the same changing arrangement, one finder, a very fair shutter working in front of a single combination lens, and is covered with black cloth.

Remarks.—The makers candidly say that "it does not profess to be a high-class camera," but nevertheless it is certainly wonderful value for the money.

Price £1 2s. 6d.

97.—**The "Crouch"** (Henry Crouch).

Features.—Lever movement.

Description.—See Phot. An., 1891, page 339. One considera le improvement has, however, been added. Not only is a rising front now provided, but a cross front as well; and these are accomplished in such a simple manner that it seems almost absurd that no one thought of it before. It merely consists in making the front slide in grooves either way. I am almost ashamed to confess it, yet it is a fact that the two movements are so simple that as a hand camera worker I ought to have seen the method long ago. But I didn't, and Mr. Crouch has. *Voila le différence.*

Price, ¼ pl., £6 16s.

98.—**The "Popular"** (E. A. King).

Features.—Same as No. 81, but with full-size finder.

Details.—Whilst these are the same in most respects to No. 81, they possess the advantage of a full-size finder, by the use of a second lens of identical focus.

Prices—

No. 2.	View Lens	..	..	..	..	..	..	£1	15 0
,, 2a.	R.R. Lens	..	..	..	..	..	..	2	10 0
,, 3.	Special Shutter	..	..	..	..	..	..	2	2 0
,, 4.	R.R. Lens	..	..	..	..	..		3	3 0
,, 5.	Thornton Shutter and focus arrangement						..	5	5 0

99.—**The "Lothian"** (A. H. Baird).

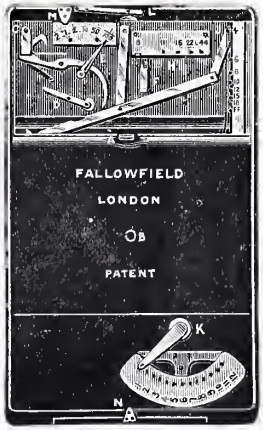
Features.—Dark slides for films.

Description.—This was described on page 286 Phot. An., 1891, as "Baird's." The improvement for this year consists in fitting special dark slides for cut celluloid films. These are very portable and convenient; six slides together measure only $5\frac{1}{2} \times 4 \times 2\frac{5}{8}$, and weigh, duly charged, 1½lbs.

Price £5 10s.



Fig. 1.



No. 100. Fig. 2.

100.—**The "Fallowfield"** (J. Fallowfield).

Features.—Grooved reservoir. Removable boxes.

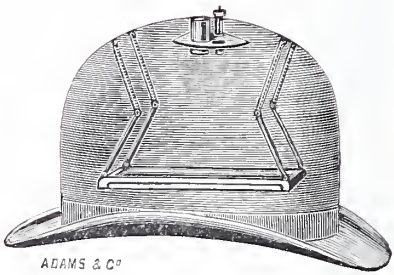
Description - Quite a new introduction. This is an age of progress—in hand cameras at all events. The Facile, as everyone knows, was, and is still, a very popular camera. Then followed the Miall, and now we have one that combines the features of both. In the Fallowfield the grooved reservoir of the Facile is amalgamated with the removable reservoir of the Miall. So far I have only been able to *inspect* the new production, but it certainly appears a good thing. The general style will be seen by the illustrations above, but a more detailed description will probably help the comprehension of my readers. Each store box (grooved) carries twelve plates or films in sheaths, and as the cost of these boxes will not be more than about 15s., a fair number of plates will be available without incurring any very great expense. Of course *il va sans dire* that the boxes may be changed in broad daylight—bright sunlight if my readers like. The camera is covered in crocodile morocco leather, and there is not a single projection likely to attract attention. In fact, there is no mecbanism in view at all. A point I saw at once that does not always receive the attention it deserves is that at the bottom, where are all the movements, a covering lid of ebonite is provided. This not only completes the circle as regards concealment, but effectually prevents the admission of dust and dirt into the working parts. This will be seen in the illustration. The lens is a rapid rectilinear of 5½in. focus, same as used in the Facile, to which is attached an Iris diaphragm (H), with apertures from f/8 to f/44. The covering flap for the lens is actuated by a spring, and when open forms a sky shade. By a very ingenious device, the finders are uncapped at the same time, so there is no danger of firing a shot without uncapping the lens, unless the finders are not used at all; and as two good finders are provided, it is inconceivable that anyone would wilfully do without them. Certainly, if finders are not present, the worker may make a virtue out of a necessity. But that is really outside of the question when they *are* provided. And whilst upon this question I can repeat with sincerity that no manufacturer sinks his finders so thoroughly as does Mr. Fallowfield. In this camera the finders are close to the lens, very deep down from the top of the camera. There is also another peculiarity, which is that the same finder serves for both the horizonal and vertical positions, a slight push serving to move it to its desired position.

Focussing is done by the arm J, registering upon a plate at 4, 6, 8, 10, 12, 15 and 18 feet, beyond which the focus becomes fixed. The shutter works between the lenses, and can be automatically set for exposures of $\frac{1}{100}$, $\frac{1}{50}$, $\frac{1}{10}$, $\frac{1}{2}$, 1, and even two seconds. The latter will take some practice, however, as even half a second is a severe test for steadiness in holding the camera. The desired changes are effected by the speed indicator (E), the arm being set at C, and released by D, which automatically works an interior flap shutter behind the lens. For time exposures beyond two seconds, C is caught by an arm, and only the flap shutter worked. By simply pointing arm K to any number, that plate can be brought into position, so that the advantage of exposing any particular plate is afforded. This, at the same time, renders another convenience possible, that of focussing direct upon the screen, and not only is this useful for special purposes, but it helps now and then to check the distances as registered on the plate, whether for accuracy in the mechanism and focus of the lens, or for our own conception of space The camera is fitted with lock and key for safety, sockets for use on a tripod, and it can be made any size. Now, in conclusion, I trust my readers will give me credit for a sincere endeavour to be straightforward and impartial. If they expect that all these conveniences can be attained in a camera that will go into the waistcoat pocket they are mistaken. The Fallowfield is certainly of fairly bulky proportions, but you must sum up the situation for yourselves. Here is a good thing, an all-round tool, which will not go into your pocket. The simple question comes, is it worth while carrying it? As a hand camera worker of at least some experience, I assert—it is.

Price £7 17s. 6d.



Fig. 1.



No. 101. Fig. 2.

101.—**The "Hat"** (Adams & Co.)

Features.—Dark slides. Fitted to hat.

Description.—The term "this is not a toy" is one that we photographers constantly see; and yet in this instance I feel constrained to repeat it. There have been so many humorous attempts at concealment of a camera that to mention a "hat" camera would at first sight imply something similar. But in this case it is not so. In the first place, a full size quarter plate is used, and covered as well. The apparatus is simple enough, notwithstanding, and can be fitted to any stiff form of hat, the round billycock, or the chimney pot of the metropolis, and it can be fitted without outwardly making the slightest difference in appearance. Even the small hole necessary to permit the clear view of the lens can be so

neatly cut, and the part fitted in as to attract no attention. The camera consists of a bellows body, which lies flat in the ordinary way, but is extended by wires when required for use. Special form dark slides of course are necessary, and in addition there is a focussing screen. The shutter is quickly got ready by placing, by a half turn, the release spring into its receptacle in the front of the hat.

Remarks.—Ingenuity itself, no toy, but a really genuine quarter-plate hand camera.

Price, with two dark slides, including fitting to hat (but not the hat), £3 3s.

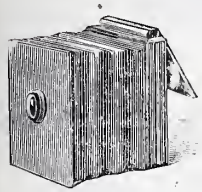


Fig. 1.

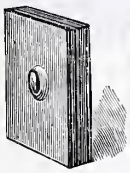


Fig. 2.

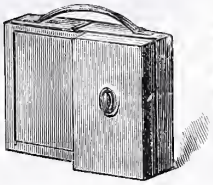


Fig. 3.

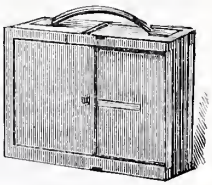


Fig. 4.

No. 102.

102.—**Portable Collapsing** (Ross Co.)

Features.—Extreme neatness.

Description.—There is no exaggeration in saying that this camera will go into the pocket. Fig. 1 shows the camera extended with dark slide drawn. To do this the front is merely pulled out, two arms and springs inside keeping it rigid when in use. To fold the front is merely pressed back again, and the camera is as shown in fig. 2. The lens is a rapid symmetrical with revolving diaphragms, and a neat shutter working behind the lens is set and discharged from the front. Both time and instantaneous exposures may be given. Some idea of its neatness may be gleaned from the following dimensions :—

$4\frac{1}{4} \times 3\frac{1}{4}$ camera, closed, with lens and dark slide ..	$5 \times 4 \times 1\frac{5}{8}$ in.
$4\frac{1}{4} \times 3\frac{1}{4}$ magazine to carry 14 plates	$8 \times 5\frac{1}{2} \times 2$ in.
$4\frac{1}{4} \times 3\frac{1}{4}$ camera with magazine and 2 dark slides ..	$8 \times 5\frac{1}{2} \times 3\frac{1}{2}$ in.

The magazine is shown in fig. 4. It appears simple in action and not likely to get out of order.

Remarks.—My trials with this camera turned out eminently successful. The ease with which it is opened and closed is wonderful.

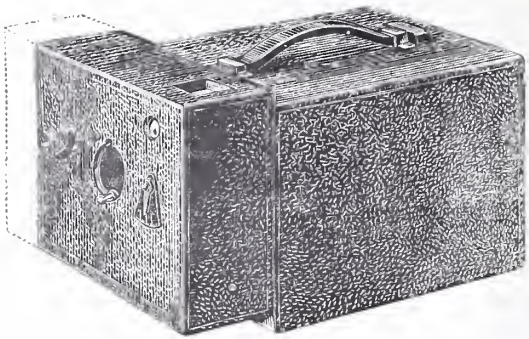
Prices, which include three double slides or one magazine instead—$\frac{1}{4}$ pl., £7 7s.; 5 × 4, £8 8s.

Extras.—

Canvas case for $\frac{1}{4}$ pl. camera and 3 slides ..	8/6
,, ,, ,, ,, 6 ,, ..	10/6
Extra magazines	37/6 and 45/-
Extra slides	12/6 ,, 15/-
Focussing screens	2/- ,, 2/6

103.—**The "Dresser"** (H. Crouch).

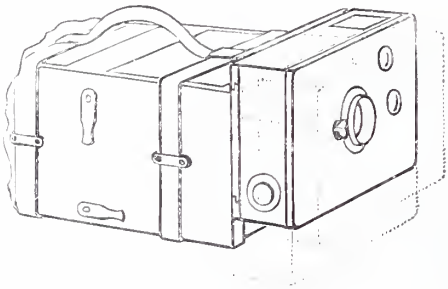
A new pattern, just in time to be included. This camera was designed by Mr. A. R. Dresser. It is exceedingly light and portable, carries a roll holder and three double backs. It has a focussing adjustment, the image



No. 103.

being thrown in the ordinary way on a ground glass. The shutter is time and instantaneous, giving automatically a range from $\frac{1}{100}$ sec. to 3 sec.

Price—£10 10s., or, with aluminium fittings, £12 12s.



No. 104.

104.—**Crouch's Rising Front** (Henry Crouch).

This is the front referred to in No. 97, and it is fitted to both the "Dresser" and "Crouch" hand cameras.

SPECIAL CAMERAS.

The following were noticed in the "Photographers' Indispensable Handbook":—

Optimus Reflective...P.S. & R.	Portable Binocular...Stanley	Optimus Micro ...P.S. & R.
Enjalbert ... ...Marion	Engineer ... ...Stanley	Micro ... ...Robinson
Stebbings ... ...Mason	Small Micro ... ...Crouch	Micro ... ...Wood
Portable Wood ...Stanley	Small Micro ... ...Mason	

The following were noticed in "Photography Annual," 1891:—

Cylindrograph ...Houghton	Verak ... ...Scott	Instanto. Stereo...Lancaster
Fichner's ... ...Schölzig	Chadwick's Stereo...	Merveilleux ,, ...Lancaster
Laboratory ... ...Griffin	Combination ,, ...Mitchell	Portable ,, ...Ross
Miniature ... ...Griffin	Combination ,, ...Shew	Ransom's Com. ,, ...Marion
Schafer's Micro ...Swift		

105.—**The "Photomnibus"** (Wormald & Co.)

Details.—The "Photomnibus" is not a toy, but more of an optical curiosity. Yet it is scientifically and practically constructed. A pinhole takes the place of the lens, and thus we have for the merest trifle a really genuine means of testing a style of photography about which so much has been written and discussed these last two years. On that score the apparatus alone should command attention from photographers. It consists of a light but strongly constructed camera of wood covered with imitation morocco. The back falls back and reveals a sheath, into which is placed the plate. In use it is loaded in the dark room, the cap being placed upon the front, and the camera back closed up. Of course no focussing is required, the aperture being merely opened for the exposure, and the whole finally returned to the dark room, where the plate is taken out and developed. The exposures quoted in the instructions are as follows:—

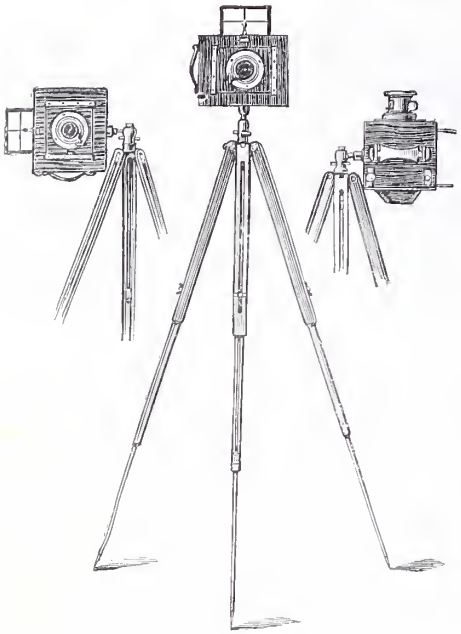
"At mid-day, with the sun shining brightly, the exposure with 30 times plates as supplied will be about

2½	minutes	in January and November
1½	,,	,, February and October
1	,,	,, March and September
55	seconds	,, April and August
45	,,	,, May, June, and July
3	minutes	,, December.

If the sun is obscured and sky bright, it will be necessary to double the exposure, and three times as much may be given if cloudy, and four or five times if dull or rather gloomy With 60 times plates in summer time portraits and groups may be taken; at any time 60 times plates will only require half the exposure needed with plates of 30 times rapidity."

Remarks.—I found upon a dull, foggy day, the only chance I had, that it took six minutes to obtain a properly exposed negative, but was quite satisfied that the apparatus is practical. With regard to the question as to whether the same amount of diffusion of focus is permissible in a ¼-plate print as in one, say, 8½ × 6½ or 12 × 10, I must leave to others to decide. But this is apart from the question altogether as concerns the "Photomnibus," the real question being whether it will, considering the low price, give good results. I assert that it will. Included in the box are plates by the Paget Prize Plate Company, a bottle of developer, and hypo, so that it is actually complete and ready for immediate trial.

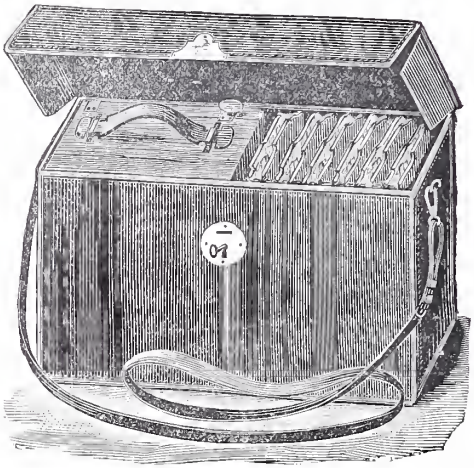
Price 2/6.



No. 106. Fig. 1.

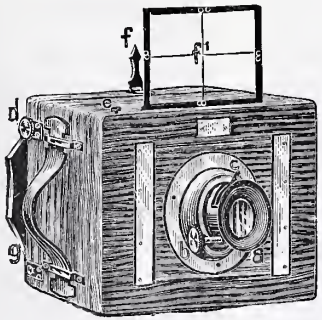
106.—**The "Anschutz"** (Blackfriars Photo Co.)

Details.—An apparatus for instantaneous work. When the apparatus is fitted into the case, as in fig. 2, the lens is turned inside the camera, and the space required for packing is thus very much reduced.



No. 106. Fig. 2.

To take instantaneous photos the blind or shutter must be drawn up until the slit disappears. The correct position is marked by a red line on the shutter. When the dark slide with dry plates is put into the back frame it must be pushed in until the spring catches.



No. 106. Fig. 3.

In taking the subject the view-finder is used by getting the top of the pointer on a point where the two wires cross each other. By pressing the small button with the finger of the right hand the instantaneous shutter will be released. The regulation of the slit in shutter is very simple. The small button, which hangs to a string, must be pulled downwards. It is moved to the right to narrow the slit or to the left to make it broader. Fasten the button again in the hole on the top. The regulation of the size of slit depends, of course, on the light, but is learned more by experience than anything else. In focussing an object like a running horse it must be only an inch in width, and the slit must be more or less wider than a quarter of an inch if the object is 15 yards distant. The ground glass is for the purpose of fixing the focus, and the following screw is for giving a sharp outline. For greater distances it is better to have the stop as small as possible.



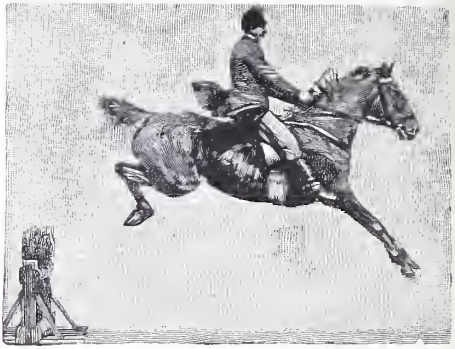
No. 106. Fig. 4.

Fig. 4 shows the camera in use as a hand camera. It is well known that for a long time Mr. Anschutz has devoted himself especially to instantaneous photography. It is sufficient to refer to his pictures, which represent all the motions of a horse in full gallop, and other moving objects, such as are shown in figs. 5 to 7.

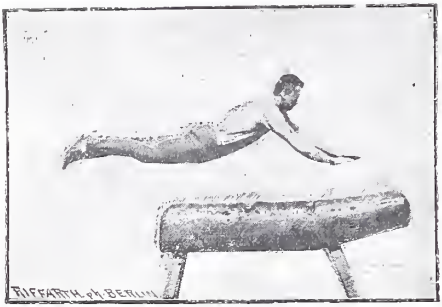
Remarks.—The advantages of this camera are as follows:—The instantaneous shutter is made in the style of a blind with one slit, and can be regulated according to desire. For instance, if the slit is made 1in



Fig. 5.



No 106 Fig. 6.



No. 106. Fig. 7.

wide, then the exposure will be ten times longer than if the slit was a tenth part smaller. By the construction of this camera it is possible to take a picture in the space of 1,000th part of a second. The new view finder has the preference of all others. The object can be seen in the exact position in which it will appear on the plate, and the surroundings and background can be well judged of. Over the ground glass is a four-fold trap instead of the black focussing cloth generally used. The lightning stand can be folded up, and weighs under 2lbs. It is fitted with a tripod stand, which gives any position to camera, as will be seen in fig. 1. The lens in the camera is called Goerz extra rapid lynheiskop, and is the best with Iris diaphragm and screw for regulating the focus. With this shutter and lens Mr. Anschutz successfully photographed a cannon ball in flight. The width of the slit was $\frac{1}{250}$th inch, and the actual exposure was $\frac{76}{1000000}$ of a second. Mr. Krupp, the great cannon maker, rewarded this unexampled feat by a present of 5,000 reichs marks. From this it is evident that no shutter and lens is better adapted for instantaneous work than the "Anschutz."

Price, complete in case with six double backs, £10 10s.

Extra.—Tripod, 24/-.

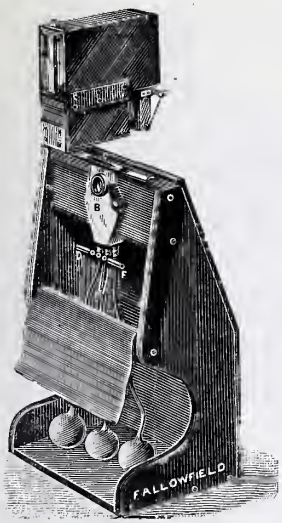
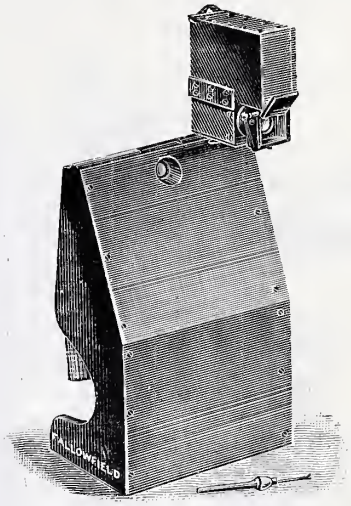


Fig. 1.



No. 107. Fig. 2.

107.—**Nievsky's Ferrotype** (J. Fallowfield).

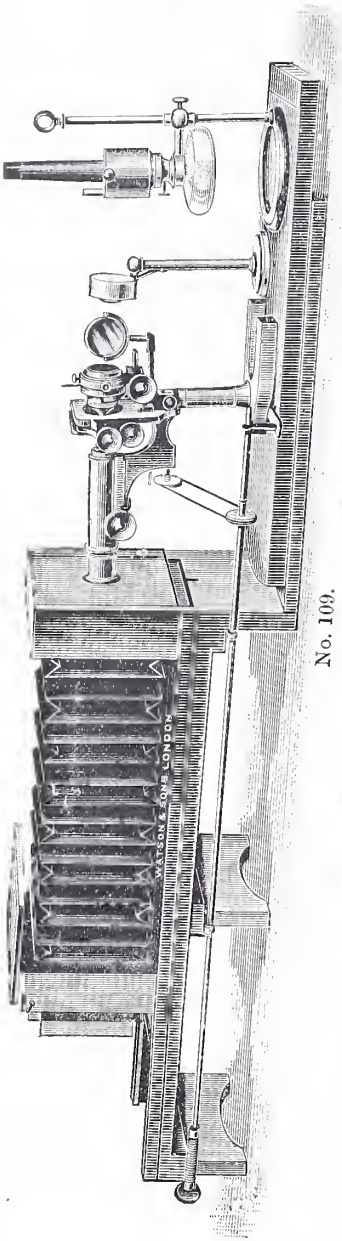
Description.—A very recent invention of Mr. Nievsky, so well known in connection with the automatic photograph machines as the maker of the dry ferrotype plates. The whole apparatus is contained in a small box, 12 × 9 inches, and yet leaving room for the storage of several hundred plates. The apparatus is really a combined camera and developing box, termed the "Aspirator Tank," and can be worked at the rate of a picture every one or two minutes in constant succession, without either a dark room, or touching or changing the developer. The mode of working will be seen after the following description has been read:—Fig. 1 shows the apparatus ready for use. Part marked A is the shutter, that is pulled right up, then pressed down, and this action places the plate in camera ready for exposure; after exposure the camera moves right along the groove, and stops directly over the opening C, which allows plate to fall into tank B by releasing small lever at bottom of camera; then tap D is released, which contains developer in rubber reservoir, the ball pressed, and developer enters tank; then tap D, when development has been sufficient, is closed up and then released again, and liquid will flow back into reservoir; then tap E is released, which contains fixing bath, and closed in same manner; then tap F, which contains water for washing, is worked the same way. The presence of hypo in the developer has rather a good effect on developer, and in no way interferes with its working. By means of the dipper (see fig. 2) the plate comes out finished.

Remarks.—This ought to prove a boon if worked with any degree of intelligence. The results I have seen are excellent.

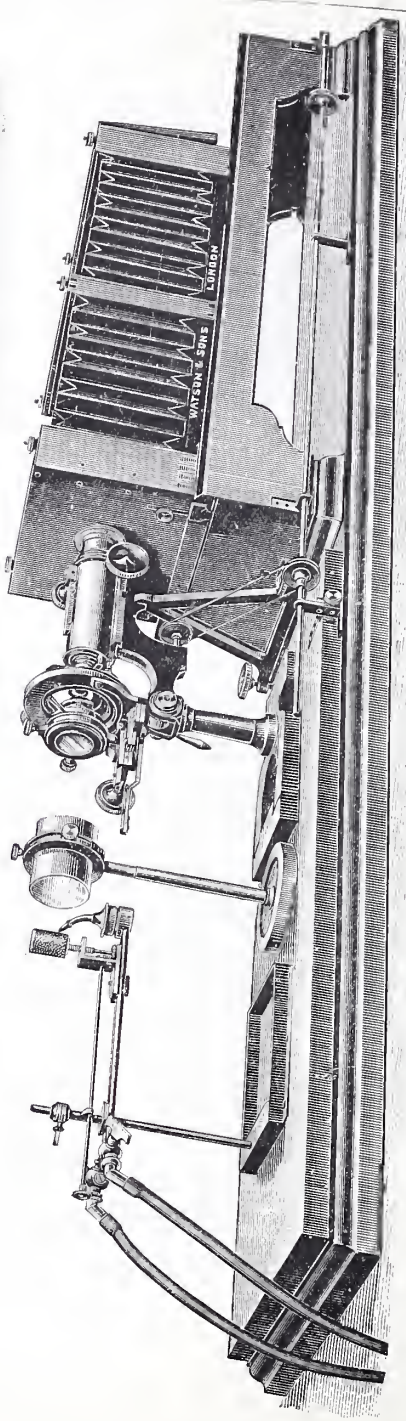
Price, which is all complete, combination lens, &c., £6 10s.

108.—**Micro-photographic Outfit** (W. Tylar).

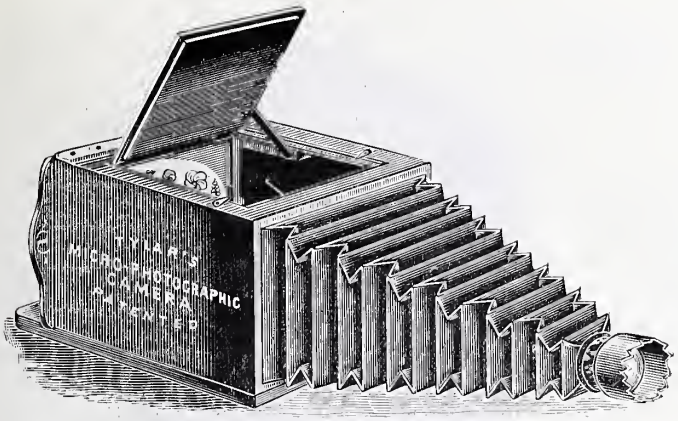
As an old microscopist Mr. Tylar had noticed the absence of a cheap instrument that could be easily mastered by the student and enable him to record his observations by the aid of photography. Most of the instruments made were too costly and too elaborate for occasional use in study,



No. 109.



No. 110.



No. 108.

and the outcome has been the production of the camera here figured. The focussing is accomplished by looking through a lid on the top of the camera, doing away with all complicated focussing rods, &c. The tube of the instrument is placed in the bellows of the camera, the microscopic slide in position illuminated by a lamp at the back of the stage, and the hands are then at liberty to manipulate the rack of the microscope for focussing as in the usual way.

Price, sent out in a neat case, complete, 27/6.

109.—**The Student's Photo-Micro Apparatus** (Watson & Sons).

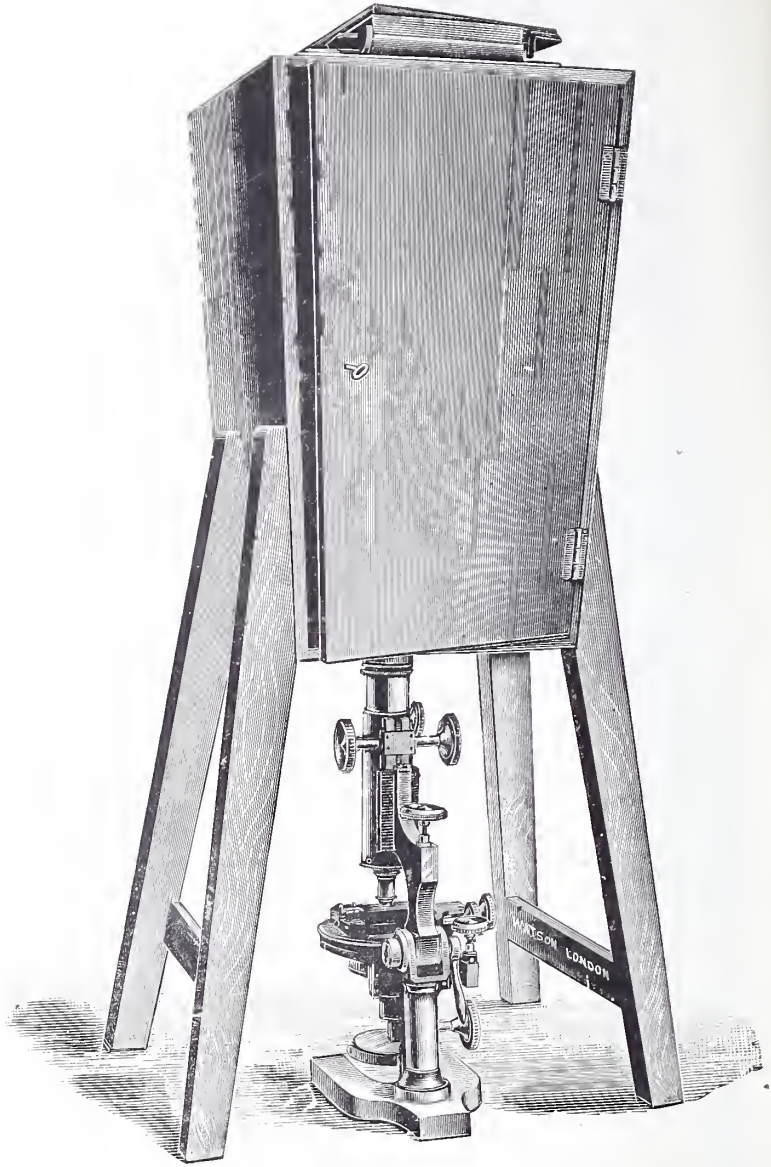
The view is slightly out of correct perspective. The apparatus consists of a mahogany camera, 6½ by 4¾ inches, with bellows body, extending to 30 inches, the base of the camera having a divided scale let into it, so that the distance between lens and plate may be accurately known to obtain any desired amount of amplification; has a rod from the back of the camera to the front, to attach to the fine adjustment, for focussing from back of camera, and is fitted with new pattern projecting front for holding microscope and lamp. This consists of two boards, one rotating on top of the other on metal centres, the microscope being fitted on this rotating front; the board carrying the instrument can be turned half-way round for adjustment, and the object fixed in position by the eye ready for photography. The board is then turned back, and locks central with the front of the camera. In this way the object can be adjusted without inconvenience.

Price, with one double slide, £4 15s.

Extras.—See Part IX., "Sets."

110.—**The Laboratory Photo-Micro Apparatus** (Watson & Sons).

The illustration is out of perspective, but nevertheless gives a good idea of the apparatus. It has a solid-framed baseboard running the entire length of two inches thick, the camera itself having an extension to 36 inches, a divided scale being let in so that any required amplification can be at once obtained; the bellows is supported in the centre, and at each end has arms which can be clamped before exposure. This, in addition to the ordinary sliding clamp, makes it firm and free from vibration. The projecting baseboard on which the instrument is placed is 24 inches long. On this, rotating on a metal turntable, is fitted another board, which can be turned at right angles, so that all adjustments may be made visually, then turned back to the photographic position and clamped, when the object,



No. 11.

etc., will be ready adjusted. A rod runs along the side of the camera, by which connection is made with the fine adjustment milled head of the microscope, so that adjustments on the focussing screen may be made from the back of the camera. A flap shutter worked from outside is fitted on the inside front of the camera for making the exposures.

Price £10 10s.

111.—**Van Heurck's Micro-Photo Apparatus** (Watson & Sons). This has been introduced to meet the wisbes of those desiring to work a vertical camera, and although the horizontal pattern is certainly more universally popular, yet the vertical one illustrated possesses several advantages. The tube of the microscope is attached to the camera by means of a velvet cone, and projects through an opening in the base. On one side of the body a door with rabetted fittings is placed so that the worker can see into the camera, and the eye placed to the tube of the instrument to make the adjustments. The door is then closed, and final focussing is accomplished on a screen at the top of a camera.

Price, with mask and diaphragm, and half-plate double slide, £4 15s.

Extras.—Inner frame, 1/9. Baseboard, with fittings for camera feet and microscope, 17/6. (For other accessories see Part IX., "Sets.")

Apparatus Pertaining to the Camera.

The following articles were noticed in the "Photographers' Indispensable Handhook":—

Multiplex Back	...Dale
One Back ...	...Coppin
Changing Box	...Hare
,,	...Houghton
,,	...Lancaster
,,	...Stereo Co.
,,	{Sands and Hunter
,,	...Mason
Camera Bellows	...Platt
Focussing Eye Piece ...	...Newton
Focus Glass	...Marion
,,	...Robinson
Ready Finder	...Stereo Co.
Midget ,,	...Stereo Co.
Watson's Finder	...Watson
Compacta Envelope ...	...Marion
Shutter Stop	...Watson
Featherweight Slides ...	...Lancaster
Metal Slides	...Tylar
Film Carrier	...Eastman
Paper Strainer	{Morgan and Kidd
Roller Slide	...Eastman
Roll Holder	...Stereo Co.
Camera Fittings	...Lancaster
Newbold's Finder	...Marion
Focusser & Finder	...McKellen
View Finder	...Newton
Roller Slide	{Morgan and Kidd
,,	...Thornton
Lengthening Front	Collins
,, ,,	Shew
Bellows Cone	{Sands and Hunter
Camera Adapter	...Shew
Focussing Bag	...Stanley
Camera Cases	...Lancaster
,,	...Appleton
,,	...Underwood
View Meter	...P.A.S.A.
,,	...Reynolds
,,	...Sands
,,	...Wood

The following were noticed in "Photography Annual," 1891:—

Camera Fittings.

Micro Attachment	..Mawson
Plumb Indicator	...Thornton
Rising Front	...McKellen
Stereo Front	...Gotz
Tilting Table	...Tylar

Camera Levels.

Aptus ...	...Sharp
Autocrat ...	...Martin
Challenge ...	...Adams
Taylor's ...	...
Wynne's ...	...Martin

Carriers.

Film... ...	...Chadwick
Sheaths ...	...Adams
Film... ...	...Fallowfield

Changing Backs.

Eureka ...	...Rouch
Fichner's ...	...Schölzig
Film... ...	...Gotz
Shew's	

Dark Slides.

Barnett's ...	...Chadwick
Film... ...	...Turnbull
Metal ...	...Tylar
Protector ...	.. Adams
Protector ...	...Tylar
Protector ...	...Vevers
Single Metal	...Tylar
Skinner's ...	...
Talbot & Eamer's	..

Finders.

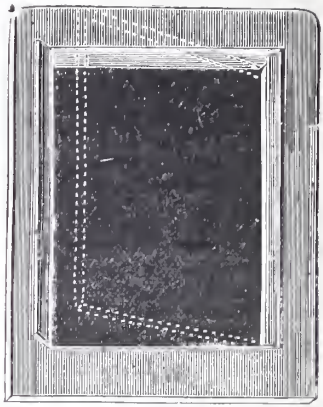
Aptus ...	...Sharp
Camera ...	...Stanley
Concave ...	...Beck
Detachable...	...Fallowfield
Detachable...	...Lancaster
Detachable...	...P. S. & R.
Hand Camera	...Adams
Side View ...	...Fallowfield
Taylor's ...	...
True Proportion	...Tylar
Vever's ...	...
Ward's ...	...
Wratten's ...	...

Focussing Apparatus.

Adjustable Glass	...Beck
Combined Glass	...Blackfriars
Combined Glass	...Humphries
Cycle Focusser	...Skinner
Focussing Chamber	...Tylar
Focussing Cloth	...Houghton
Optimus Glass	...P S. & R.
Self-attaching	...Marion
Taylor's Glass	...
Tylar's Glass	...



Fig. 1.



No. 112. Fig. 2.

112.—Single Metal Slide (W. Tylar).

These were just squeezed in last year at the last moment, but it has since been considerably improved. It is very thin and light. The shutter pulls right out of the groove, which closes automatically. The plate is inserted by raising an inner flap of metal, dropping the plate into position, and by replacing the flap of metal the plate is secured in its place. The shutter cannot scratch the film. One great advantage of single slides is that double exposures are less frequent. These slides are machine made, and interchangeable. The same slides are in preparation for films, will fit the same grooves, and be at the same prices as the others.

Price, ¼ plate. 15/- per dozen.

113.—Film Slides (Sands, Hunter & Co.)

These are marvels of lightness. True, they are single slides, that is, for one film only, but against that must be placed the fact of their exceeding portability. The one sent me, ½-plate size, weighs 3¾oz. only, and is ¼ inch thick. The framework is of wood with a cloth back, and a millboard shutter, the latter after the American pattern slides. A metal hinge keeps the film in position. So far as I have tried it it is perfectly light-tight, and should prove a boon to travellers. Taking an ordinary half-plate slide to weigh 12oz, and to occupy a bulk of at least ¾ of an inch, the calculation comes out as follows for six exposures :—

3 double slides, ordinary, 2¼ inches thick, weighing 2lbs. 4oz.
6 single slides of this make, 1½ inches thick, weighing 1lb. 6½oz.

Prices—¼ pl., 3/-; ½ pl, 4/-; ¼ pl., 5/-

114.—Film Slide (Jas. Thomson)

This is extremely simple, and yet my trials with it have proved it to be perfectly effective. The bottom of a solid dark slide is cut, the films are first placed in, and then a division slipped up between them. The ¼ plate (double slide too) is only $\frac{7}{16}$ths of an inch thick, and weighs just under 3½ ounces. The ½-plate size is also very light, being under half an inch thick, and weighing only 6½ ounces. In order to be able to give a comparison I weighed a light ordinary slide and found it to be 11 ounces, and to be ¾in. thick. Each of these film slides has hinged shutters and ivory numbering tablets.

Prices—¼ plate, 6/6; ½ plate, 9/-.

115.—**The "Lothian" Film Slides** (A. H. Baird).

These are referred to in connection with the Lothian hand camera, No. 99, but Mr. Baird makes them to fit any camera. The film is put in from the front, and the ebonite shutters draw right out. Two metal sheaths, grooved on two sides and at the bottom hold the films; these are provided for in the slide by a groove at the bottom and clutches at the top. Considerable care is taken to prevent the admission of light upon withdrawal of the shutter, a very strong spring being affixed. The slide altogether is wonderfully neat, and extremely light.

Prices—¼ pl., 5/6; ½ pl., 8/-; ¼ pl., 12/6.

116.—**Film Slides** (London Stereo Co.)

These closely resemble the ordinary pattern, and can be made to fit any camera. They are of the solid form, and the films are slipped into grooves on the centre partition, which is then slipped into the slide. These slides occupy just half the space of the ordinary double backs. A set of six, fitted into a neat leather case, forms a very useful addition to one's outfit.

Prices—¼ pl., 15/-; ½ pl., £1 1s.; ¼ pl., £1 11s. 6d.

117.—**Film Carriers** (London Stereo Co)

These are for holding cut films in ordinary slides. A light metal frame is hinged on to a thin plate of ferrotype iron, and the film placed between. Their advantage lies in the fact that as the carrier is open on three sides, the exact cutting sometimes necessitated is not called for.

Prices, per dozen—¼ pl., 12/-; ½ pl., 16/-; ¼ pl., £1 1s.

118.—**Film Carriers** (J. R. Gotz).

The fact that there is a future before cut negative films is gradually growing upon us. Mr. Gotz has turned his attention to the matter with the result of a neat metal back into which the film is slipped under two grooves The metal is turned over at the back and forms a spring to keep the film tight up to register. They are light, easy in use, and very cheap, and they may be used equally well in solid or book form dark slides.

Prices, per dozen—

¼ pl.	½ pl.	¼ pl.	10 × 8
4/-	6/-	12/-	16/-

119.—**The "McDougall" Divided Carrier** (W. Tylar).

This is an internal frame or carrier to fit in the usual dark slide to enable the smaller-sized plates to be used. It differs from others, inasmuch as it has a plate of metal immovably fixed in the centre to divide the plates from each other, and instead of the loose card usually used. It also prevents access of light from one plate to the other during exposure.

Prices—

½ plate, for	3¼ × 3¼	.. .. ..		1/3
½ ,, ,,	¼	.. .. ..		1/3
½ ,, ,,	5 × 4	.. .. ..		1/3
1/1 ,, ,,	½	.. .. ..		2/-
1/1 ,, ,,	5 × 4	.. .. ..		2/-
1/1 ,, ,,	¼	.. .. ..		2/-

120.—**Dividing Plates for Dark Slides** (W. Tylar).

Are of two qualities, consisting of sheets of black cardboard or metal, with small fixed springs attached for putting between the plates in a dark slide, dividing them, and at the same time pressing each into its proper position against the rebate of the dark slide.

Prices not yet fixed.

121.—**Cheap Finders** (Edward Ward).

These were noticed page 360 Phot. An., 1891, but this season the body is made entirely of metal, though at the same

Price, 1/3 each.



No. 122.

122.—**The "Lothian" View Finder** (A. H. Baird).

These are cheap but good little finders at popular prices. They are made either for direct vision or in the reflecting pattern, and the

Price includes the screw attachment—Direct view, 2/3; reflector, 2/6.

123.—**The "Sensible" Focussing Cloth** (T. Manson).

This has been improved of late, and is now constructed so as to lie underneath the camera. This makes it easier to work, with turntable cameras especially, and it is also more convenient with any camera. Considering the convenience of a properly designed and well made focussing cloth, we really ought not to put up with such makeshifts as we do, especially as the cost is so low.

Prices—¼ pl., 2/6; ½ pl., 3/-; ¼ pl., 3/6.

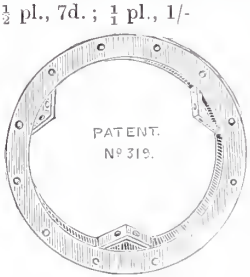
124.—**Camera Cases** (Levi & Co.)

This firm are making some excellent cases for the camera and fittings. Solid leather, lined with green baize, snap lock, and partitioned. Of very handsome appearance externally, well and strongly made; in fact, as good as anyone can wish.

125.—**Celluloid Focussing Screens** (E. H. Fitch).

A substitute for the easily breakable ground glass, which are as fine in grain, and stiff enough to keep a perfectly flat surface.

Prices—¼ pl., 3d.; ½ pl., 7d.; ¼ pl., 1/-



No. 126.

126.—**Camera Turntable** (Lonsdale Bros.)

A new design, very light but rigid, inserted flush with baseboard and bound with flat brass circle. The prices are moderate, too.

¼ pl.	½ pl.	¼ pl.
10/6	11/6	13/-

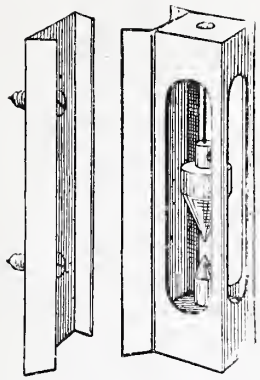


No. 127.

127.—**"Aptus" Plummet Indicator** (Sharp and Hitchmough).

This is not a new idea, but an indicator of an improved construction, and guaranteed to plumb the camera without any trouble. The chief fault with some of the old-pattern indicators was that they were so sluggish in action. The new form is beautifully sensitive.

Price 1/-

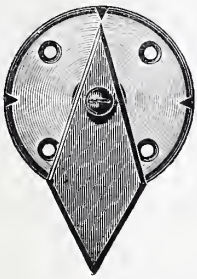


No. 128.

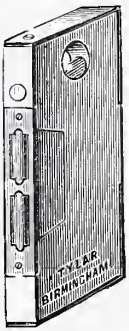
128.—The "Lothian" Universal Plummet (A. H. Baird).

A very useful little attachment to the camera for levelling purposes. The small piece on the left side of the illustration is fixed to the camera, into which the other slides rapidly and easily as required. The advantage of a plummet at the side is that it is seen at whatever altitude the camera may be placed, and it gives both horizontal and vertical inclinations. It is a capitally designed article and ought to command a large sale.

Price, complete in box, 2/-



No. 129



No. 130.

129.—Revolving Plumb Indicator (W. Tylar).

This should be a useful appliance for squaring up hand cameras, for instance, because as the camera is turned over the indicator registers itself by the top point corresponding to a notch in the circular plate.

Price 1/-

130.—Common Sense Level (W. Tylar).

With this the camera can be adjusted both horizontally and vertically. It is very neatly made in boxwood, and strongly brass-bound. The illustration above shows it clearly.

Price 3/-

Extra Dark Slides.

For the convenience of my readers, I again compile the prices of extra slides. The numbers refer to the cameras described in previous pages. Where more than one quality is priced, the best is given.

Number.	Firm.	Camera.	¼ Plate.	½ Plate.	¼ Plate.	12 × 10	15 × 12
			s. d.	£ s. d.	£ s. d.	£ s. d	£ s d.
1	London and Paris Optic Co. ..	King	—	0 15 0	1 0 0	1 16 0	—
2	Noakes & Son.....	Invicta W A.	10 6	0 14 0	0 18 6	—	—
3	Slater, W F.	Long Focus.....	—	0 13 6	0 16 0	1 5 0	1 10 0
5	Ashford, J.	Ashford's..... ..	8 6	0 12 6	0 18 6	—	—
6	London and Paris Optic Co ..	Baron	—	0 15 0	1 0 0	1 16 0	—
8	Scorer, W.	Scorer's	6 0	0 12 6	1 0 0	2 0 0	2 8 0
9	Sands, Hunter & Co.	Exhibition	15 0	1 0 0	1 5 6	1 16 0	2 10 0
10	Perken, Son & Rayment	Rayment Imp.	11 0	0 15 0	1 1 6	1 11 6	2 7 3
11	Adams & Co.	Royal	—	0 17 0	1 2 0	—	—
12	,, ...	Victor	—	0 15 0	1 0 0	—	—
13	Watkinson & Co.	Airedale	—	0 9 0	0 14 0	—	—
14	,, ...	Popular	8 6	0 12 6	0 18 0	1 6 0	—
16	Fallowfield, J.	New Perfect	13 0	0 15 0	1 0 0	1 10 0	2 0 0
7	Archer & Sons	Liver	—	0 17 6	1 5 0	2 0 0	2 10 0
18	Watkinson & Co.	Minim	9 6	0 14 0	1 1 0	—	—
20	Pearson & Denham	Collapsible	—	0 13 6	0 18 6	1 6 0	—
21	,, ...	Spécialité.....	—	0 10 0	0 15 0	1 3 0	—
23	Whittingham & Co	Aerial	—	0 18 6	1 2 0	1 12 6	2 2 6
25	Lancaster & Son	Alum. Instanto.....	10 0	0 15 0	1 5 0	—	—

Number.	Firm.	Camera.	¼ Plate.	½ Plate.	¼ Plate.	12 × 10	15 × 12
			s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
26	Houghton & Son	Holborn Special	—	1 2 6	1 5 6	2 0 0	2 15 0
27	,,	Holborn	11 6	0 16 0	1 4 0	1 16 0	2 8 0
28	Parker & Co.	Companion	—	0 15 0	1 2 0	1 15 0	2 10 0
29	Whittingham & Co.	Amateur	10 0	0 13 6	0 19 0	1 10 0	2 0 0
30	,,	London	—	0 18 6	1 2 0	1 12 6	2 2 6
31	Thornton Pickard Co.	Ruby	—	0 15 0	1 0 0	—	—
32	London Stereo Co.	Long Extension	15 0	1 0 0	1 3 6	1 16 0	2 10 0
33	Morley & Cooper	Simplex	8 6	0 13 6	0 18 6	1 9 0	—
34	Tylar, W.	Tylar's No. 2	Metal slides sold in sets				
36	Morley & Cooper	Star	11 0	0 15 0	1 1 0	1 10 0	—
37	Watson & Sons	Acme	15 0	1 0 0	1 3 6	1 16 0	2 10 0
38	Braine & Sons	Universal	—	0 10 0	0 12 0	0 18 0	—
40	Whittingham & Co.	Artist	—	0 18 6	1 2 0	1 12 6	2 2 6
41	Mitchell, S. & J.	Norden No. 2	—	0 14 0	—	—	—
42	,,	Norden No. 3	—	0 14 0	—	—	—
43	Adams & Co.	Alum. Club	—	0 19 0	1 4 0	1 16 0	2 7 6
44	Braine & Sons	Book	5 6	—	—	—	—
45	,,	Tourist	5 6	0 7 6	0 10 6	—	—
48	,,	Modern	5 6	0 7 6	0 10 6	0 18 0	—
49	,,	Export	—	0 10 0	0 12 0	0 18 0	—
50	,,	Viceroy	—	0 10 0	0 12 0	0 18 0	—

PART II.

LENSES.

The following were described in the "Photographers' Indispensable Handbook":—

Portrait ... ...Mason
" ... ...Shew
" ... ...Ross
" ... ...P. S. & R.
" ... ...Dallmeyer
" ... ...Burr
" ... ...Dale
" ... ...Fallowfield
" ... ...Grubb
" ... ...Marion
" ... ...Newton
" ... ...Thomas
" ... ...P.A.S.A.
" ... ...Shew
" ... ...Stanley
" ... ...Stereo Co.
" ... .. Watson
" ... ...Wood
Quick-acting Portrait ... ...Dale
" ...Dallmeyer
" ...Newton
" ...Thomas
" ...Ross
" ...Robinson
" ...Shew
" ...Stereo Co.
" ...Wratten
Rectilinear Portrait. Dallmeyer
Doublet (Rapid) ...Suter
" ...Fry
" ...P.A.S.A.
" ...Browning
" ...Darlot
" ...Shew
" ...Robinson
" ...Wratten
" ...P.S & R.
" ...Atkinson

Doublet (Rapid) ...Newton
" ...Wood
" ...Grubb
" ...Voigtlander
" ...Burr
" ...Fallowfield
" ...Stanley
" ...Dale
" .. Dallmeyer
" ...Hulme
" ...Stereo Co.
" ...Marion
" ...Mason
" ...Thomas
" .. Sands
" ...Taylor
" ...Tylar
" ...Watson
" ...Wray
" ...Atkinson
" ...Lancaster
" ...Mawson
" ...Thornton
" ...Mayfield
" ...Appleton
" ...Ross
Universal ... ...Darlot
" ... ...Marion
" ... ...Dallmeyer
" ... ...Ross
" ... ...Sciopticon
Wide-angle Doublet ...Suter
" ...Fry
" ...Atkinson
" ...Burr
" ...Mason
" ...P.A.S.A.
" ...Sands

Wide-angle Doublet ...Stanley
" ...Voigtlander
" ...Darlot
" ...Dallmeyer
" ...Newton
" ...Thomas
" ...Taylor
" ...Shew
" ...P.S. & R.
" ...Ross
" ...Stereo Co.
" ...Thornton
" ...Wood
" ...Lancaster
" .. Fallowfield
" ...Marion
" .. Robinson
" ...Watson
" ...Wray
" ...Appleton
" ...Dale
Single Landscape...Wood
" ...Wratten
" ...Stanley
" ...P.S. & R.
" ...Lancaster
" ...Wray
" ...Thomas
" ...Dallmeyer
" ...Taylor
" ...Shew
" ...Grubb
" ...Newton
" ...Stereo Co.
" ...Suter
" ...Appleton
" ...Mason
" ...Dale

The following were described in "Photography Annual," 1891:—

Aluminium M'nting...Stereo Co.
" Mounts...Wray
Black Band P. ...Stereo Co.
" P.S. ... "
" Q.A P. ... "
" Q.A.R. ... "
" R.L. ... "
" R.R. ... "
" W.A.R.... "
Casket Sets ... ...Taylor
" Set ... ...Wray
Challenge Detec....Adams
" Por. ... "
" R.R. ... "
Club Detective ... "
" R.R. ... ... "
" W.A.R. ... "
Combination Sets...Blackfriars
Combination Sets...Humphries
" " ...Swift
Facile Detective ...Fallowfield
Featherweight ...Thornton
Flange Adapter ...Shew
Iris Diaphragm ...Stereo Co.
" " ...Swift
Laverne's Detec....Adams
Noakes's Instan. Doubles ... ... ——
Optimus Euryscope..P.S. & R.
Paragon Detective ..Swift
" Portable ... "
" Portrait ... "
" Rapid ... "
" Universal... "
" W.A. ... "
Perfecta R.R. ...Redshaw
Pinhole ... ...Adams
Presto W.A.R. ...Redshaw
Rectigraph Comb....Lancaster
" N.A. ... "
" Landscape...Dallmeyer
Silver Ring R R. ...Lancaster
" W.A.R ... "
Sky Shade ... ...Tylar
Taylor's Detective... ——
" M.A.R. ... ——
" R.V. ... ——
" W.A.V. ... ——
Thomson's R.R. ... ——
Vevers's R.R. ... ——
W.A. Landscape ...Ross
W.A. Triple Lan....Swift
Wray's Detective ... ——



No. 131. Fig. 1.



No. 131. Fig. 2.

131.—**The Telescopic Photographic Lens** (J. H. Dallmeyer).

Probably the most startling innovation for some years is the recent introduction by Mr. Dallmeyer of a lens to give large images at great distances. The two illustrations above give a very good idea of its powers. Fig. 1 represents the view of a church about half-a-mile distant, taken with an ordinary 10 × 8 rapid rectilinear of 13in. equivalent focus. Fig. 2 shows the same church as represented by the new lens. In each case the illustrations are the exact size of the images upon the plate. I have seen various negatives, both with what might be termed fairly long focus lenses (13in. for a ½-plate is a good length) and with the new lenses. The results are marvellous, because, in addition to the increased size of image, the detail is all that could be desired. In fact, in some cases it wasbetter, even when enlarged, than the ordinary lens.

The following description is abridged from the *Photographic News*, and this in turn was founded upon a paper read before the Camera Club by Mr. Dallmeyer:—

"He commenced his remarks by showing that hitherto only two methods of producing large images had been employed—first, the use of very long focus positive ordinary lenses; and, second, the production of a primary image by one positive lens, and pacing a secondary magnifier or second positive lens behind the plane of the primary image, which enlarges it more or less, according to its focal length, and its adjustment between the

positions of the planes of the primary image and that of the focussing screen, as in the photo-heliograph, &c.

"The first of the older methods had been seldom employed except in astronomical photography on account of its unwieldy dimensions; and the second method referred to is practically useless for ordinary photographic work on account of the great loss of light involved, rendering the length of time necessary for proper exposures so great as to cause it to be almost prohibitive, except in the case of inanimate objects. The new lens is composed of only two elements, and the image given by it is primary and inverted. By the fact of the image being primary and inverted, it looks at first sight anomalous that, for equal extensions of camera, the image given by the new lens is several times larger than that given by an ordinary lens of hitherto known construction. In comparing two lenses, no matter of what form of construction (when focussed upon a distant object), if the size of the image given by one is n times that given by the other, the focus of one is n times that of the other, provided, as before stated, the images compared are direct, primary, and inverted. The focal length of a lens is measured for practical purposes by the distance between one of the principal planes containing one of the nodal points of the lens, towards the principal focal plane and that plane. In most lenses in existence the principal plane passing through the nodal point referred to can be marked upon the 'lens mount,' and has already been suggested by Mr. Warnerke as an important addition to the measurement and description of lenses as furnished by opticians. The most recent and important contribution, however, on this subject was recently furnished by Professor Sylvanus Thompson in a very-interesting paper delivered at the Society of Arts, and published in its journal. In the case of the rapid rectilinear, for example, the nodal point referred to is not exactly at the diaphragm slot but a little behind it; but in most lens constructions in use the nodal pointis within the mounting of the instrument. In some, however, by the accidents of construction it is slightly behind the lens, as, for example, in certain forms of deep meniscus; and in others it is slightly behind the mount, or in front, as in Petzval's orthoscopic."

In the *British Journal of Photography* this construction was recently referred to in a letter signed "E. Russell." The object in introducing a negative element in the orthoscopic lens referred to was for the purpose of the cure of distortion, as its name signifies, although it was not perfectly accomplished, and the nodal point is thrown only slightly in front of the lens mount by the accident of construction. Mr. J. Traill Taylor has already pointed out that this form of construction necessitated a slight enlargement of the image; but in his leading article of the 16th of October, describing the new lens, he says: "We have frequently dwelt upon the advantages that would accrue from such a construction." The argument in Mr. Russell's letter, however, appears to be the chary old one that "there is nothing new under the sun." Now, the main object of this invention has been to *purposely* throw the nodal point from which the focus is actually measured to any distance chosen in front of the lens itself into space, thus attaining a large direct image without the necessity of a bulky and long extension apparatus. The anterior element is a positive lens, preferably of large aperture and short focus; the posterior lens is a negative element of some fractional portion of the focal length of the anterior positive lens (in Petzval's orthoscopic it was more than *twice* the focus). Roughly, the shorter the focus of the posterior lens as compared with that of the anterior lens the greater is the size (for a given extension of camera) of the enlarged primary image produced. The anterior lens should be preferably of large aperture and short focus; it is self-evident, as in ordinary constructions, the larger the aperture the greater will be the rapidity, and the reason of its being preferably of short focus lies in the fact that the absolute distance between the planes of its own focus for parallel rays on the one

hand, and a near object on the other, is of course less with a short focus lens than with a lens of long focus. Referring to the figure, if the negative lens B he placed at proper distances from the positive lens A, the rays can be made to emerge parallel, divergent, or convergent. For the purpose of forming an image for any given position of the focussing screen, they must be made convergent, producing a direct primary inverted image. *It is immaterial what position may be chosen for the plane upon which the image is to be received;* it may be either in close proximity to the posterior lens, or removed to any distance whatever further away, but, in order to focus, it is essential that a correct distance be given between the two elements of the lens itself; in other words, a correct adjustment of their separation, focussing always being most easily and sometimes necessarily accomplished in this manner. For example, supposing the lens were focussed upon a very distant object (say the sun), with the focussing screen set at a given distance, it would be impossible, by any adjustment whatever of the focussing screen, to find a plane where the instrument would come to focus for very near objects. Near objects, with the lenses in their former adjusted or fixed position, would send the rays from such objects, after passing through the entire lens, divergent and not convergent. On the other hand, if the separation were adjusted between the two elements for a near object, and it was then pointed towards a distant object, it would be found equally impossible to find any position for the focussing screen in which the focus could be observed, except, as before stated, by an alteration between the separation of the component elements of the lens itself. It is evident that the longer the focus of the positive element in the construction, the greater would have to be the separation between the two elements for near or distant planes. In this construction there is, then, no limit to the size of the image that can be obtained, slight adjustment in the separation of the two elements producing the correct focus upon the screen, be it near or distant from the lens itself; but it must be borne in mind that the greater the separation between the plane of the focussing screen and the lens, the less is the rapidity that can he attained. With regard to the question of rapidity. Supposing the screen be placed at a distance of ten inches from an ordinary lens, and a distant object focussed. Say the lens has a focus for parallel rays of twelve inches, if the new lens be made to take its place, and the same object be focussed, it will he found that the image produced is five times larger with the new lens than with the ordinary one, and, to all intents and purposes, you are practically employing a lens of sixty inches focus. The question naturally asked is, What will be the rapidity? The answer is that you have to consider the front lens placed at a distance of sixty inches from the focussing screen; in other words, the nodal point is thrown forward outside the lens to a distance of sixty inches from the focussing screen.

As in the case of the telescope, the greater the magnification required, the less becomes the angle included, and there is very little difference with one and the same instrument in *the angle* included for moderate amplification, or great amplification, but, of course, *more of the plate* is covered when it is removed further and further away from the posterior lens. It will doubtless he interesting to many to know that the applications of this lens to astronomical photography are easily accomplished:—

PARTICULARS OF LENS SHOWN—DIAMETER OF FRONT LENS $2\frac{3}{4}$″.

Size of plate.	Extension of camera required from flange. Inches.	Corresponding foci. Inches.	Rapidity at full aperture.
$4\frac{1}{4} \times 3\frac{1}{4}$	$6\frac{1}{2}$	25	f/9
5×4	8	30	f/11
$6\frac{1}{2} \times 4\frac{3}{4}$	$10\frac{1}{2}$	$37\frac{1}{2}$	f/13
$8\frac{1}{2} \times 6\frac{1}{2}$	13	42	f/15
10×8	$15\frac{1}{2}$	50	f/18
12×10	18	60	f/22
——	36	120	f/40

The negative of the moon was taken with the first rough lens completed, with an extension of only twenty-eight inches. It may be regarded more as an example of possibilities in size and rapidity of action than definition. In connection with this instrument it may be pointed out that the optical finish given to these instruments is necessarily that of the finest polish bestowed upon astronomical work, for the greater the size of image chosen, the more are any slight optical defects exaggerated.

In a further communication to the Camera Club, Mr. Dallmeyer, referring to the lens as before described, said that it consisted of two cemented combinations only. It is well known that any single aplanatic lens can only define properly from the axial pencil, the definition falling off very rapidly when the pencils become even slightly eccentrical. For this reason, in using two combinations only, the correction for the eccentrical pencils has to be accomplished by a proper form ascribed to the negative element. The main drawback to this lens is that, although it may be corrected for outstanding spherical aberration *for any particular plane*, it is not rectilinear, and, moreover, it is impossible to make it so.

"As your readers are well aware, the main object in photographic lens construction is to attain the best possible definition for the eccentrical as well as the central pencils; and, in rapid portrait lenses, the number of elements employed enable this to be carried out to a much greater extent than is the case with a single combination lens.

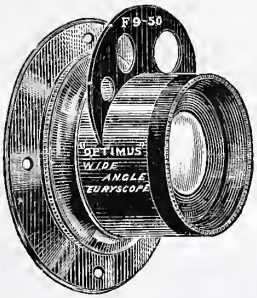
"The improvement that I have made consists in employing, in conjunction with a particular type of portrait lens, a compound symmetrical negative element that is practically aplanatic in itself, and is also corrected throughout its entire field, but of negative focus. This construction permits of an excellent correction for the eccentrical as well as the central pencils, and reduces distortion to a minimum.

"Another feature, in employing the particular form of portrait lens (introduced by my late father), is the possibility of correcting the complete combination (positive and negative) for outstanding spherical aberration throughout the entire field for any chosen plane of object or screen. If a lens of this form is properly corrected for a near object, it will be found, on employing the same instrument upon a distant object, that it is no longer perfectly corrected, but outstanding aberration asserts itself. By employing the form of portrait lens illustrated in fig. 2, a slight separation of the back lens will entirely remove this.

"This matter might strike one, at first sight, as being of little importance; but such is not the case, in that the main feature in the utility of this type of lens for ordinary purposes consists in the employment of *as large an aperture as possible*—first, on account of rapidity, and, secondly, on account of the fact that the larger the aperture the larger is the field that is covered, or angle included. Were it not for the possible means of correction referred to—by the separation of the back elements of the portrait combination—the only other method of correcting the outstanding aberration would be the employment of diaphragms that would very materially affect both the important considerations.

"I have been asked, on frequent occasions, whether still larger amplifications could not be attained with the same camera extension; this of course, is possible by employing negative combinations of shorter foci than the particular ones which I have considered a useful mean, both for the angle included and adequate intensity."

Prices—Stereo lens, with negative attachment, £10; Portrait 1B, £15 2B, £22 10s



No. 132.

132.—**The "Optimus" W.A. Euryscope** (Perken, Son and Rayment).

This was brought out just about the time the 1891 Annual was published, and was too late for inclusion. The design of the lens is to accomplish wide-angle work a little quicker than it usually has been done. The aperture is increased to f/9.50, and therefore the exposure can be curtailed when desired. So far as my trials have gone, there appears to be no sacrifice of definition, and the convenience of extra rapidity is great. Two things are gained, the larger aperture by shortening the exposure lessens halation; and focussing is easier, as the light is, of course, stronger on the screen. It ought to prove a boon to those fond of architectural work, especially such work as badly-lit interiors.

Size.	Focus.	Price. £ s. d.
5 × 4	4	3 3 0
7 × 5	$4\frac{3}{4}$	4 14 6
9 × 7	6	6 6 0
10 × 8	8	11 0 0
12 × 10	10	19 0 0

133.—**Voigtlander's Anastigmatic** (Marion & Co.)

These are what might be termed rapid wide-angle lenses, and are useful for almost any kind of work at short distances, or in confined spaces. The new series consist of three degress of rapidity and angle. Series III. lie between the rapid wide-angle Euryscope and the ordinary wide-angle Euryscope. Series IV. and V. are slower.

Prices are as follows:—

Series III.

Full aperture f/7. Angle of view 80°.

Size.	Aperture.	Focal Length.	Price. £ s d.
4 × $3\frac{1}{4}$	$\frac{5}{8}$	$3\frac{13}{16}$	3 10 0
$6\frac{1}{2}$ × $4\frac{3}{4}$	$1\frac{1}{4}$	$7\frac{1}{16}$	6 0 0
$8\frac{1}{2}$ × $6\frac{1}{2}$	$1\frac{11}{16}$	$9\frac{7}{8}$	9 0 0
12 × 10	$2\frac{13}{16}$	$17\frac{7}{16}$	19 0 0
15 × 12	$3\frac{3}{4}$	$23\frac{1}{8}$	27 0 0

Series IV.

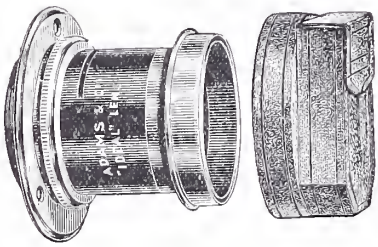
Full aperture f/ 12.5. Angle of view 100°.

Size.	Aperture.	Focal length.	Price. £ s. d.
4 × $3\frac{1}{4}$	$\frac{1}{4}$	$2\frac{1}{2}$	3 4 0
$8\frac{1}{2}$ × $5\frac{1}{4}$	$\frac{5}{8}$	6	4 0 0
12 × 10	1	$10\frac{1}{4}$	7 10 0
15 × 12	$1\frac{5}{16}$	$15\frac{1}{4}$	10 0 0

SERIES V.

Full aperture, f/18. Angle of view, 110°.

Size.	Aperture.	Focal Length.	Price. £ s. d.
$5\frac{3}{4} \times 4\frac{3}{4}$	$\frac{5}{16}$	$3\frac{7}{16}$	3 4 0
$6\frac{1}{2} \times 4\frac{3}{4}$	$\frac{7}{16}$	$4\frac{7}{16}$	3 4 0
$8\frac{1}{2} \times 6\frac{1}{2}$	$\frac{1}{2}$	$5\frac{5}{8}$	4 0 0
12 × 10	$\frac{3}{4}$	$8\frac{3}{8}$	6 0 0
15 × 12	$\frac{15}{16}$	$12\frac{7}{16}$	9 0 0



No. 134.

134.—**The "Ideal" Detective** (ADAMS & Co.)

This is the same lens as fitted to their now celebrated hand camera, and which they supply separately. Complete with stops,

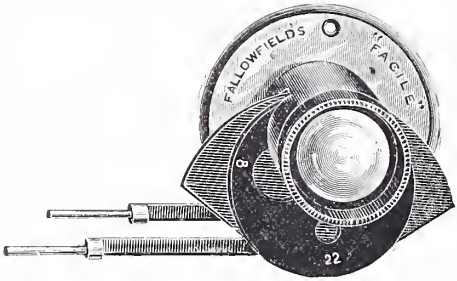
Price 31/6.

135.—**New Landscape** (W. WRAY).

Mr. Wray is busy with a series of triple meniscus landscape lenses, which he says promise to turn out very well. They will be of small diameter in proportion to the size of the plate covered, and will work at f/16.

136.—**"Premier" New Portrait** (W. WATSON & SONS).

This firm have introduced this season a new series of lenses for portraiture, which, by using for the combinations, glass differing very greatly in refractive index, they are able to retain good depth of focus and flatness of a rectilinear type, and yet work at a larger aperture than is usual with this kind of lens. Besides their value for portraiture, they will be specially suitable for groups and instantaneous work.



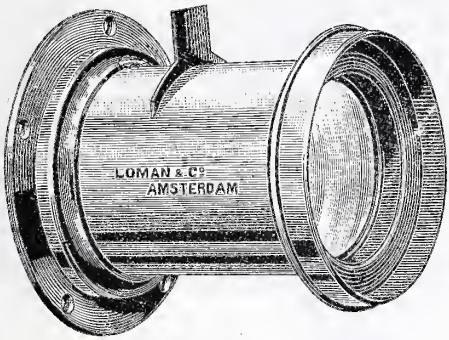
No. 137.

137.—**The "Facile" Detective** (J. FALLOWFIELD).

The illustration shows the lens fitted to the well-known "Facile" hand camera, at least it shows the rapid rectilinear pattern now adopted. They are obtainable with or without the shutter as figured.

Prices— Rapid landscape, 4½in. focus, f/11, £1 1s.
Rapid rectilinear, 5½in. focus, f/8, £2 2s.

The latter has rotating stops. The shutter is 5/- extra.



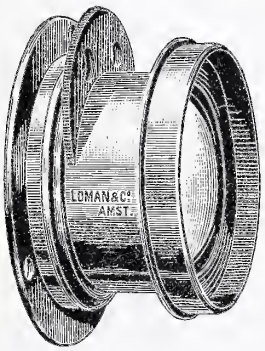
No. 138

138.—**Rapid Rectilinear** (Loman & Co.)

These are extremely good lenses, at a very low price. I have given a half-plate size a thorough trial, and am fully satisfied with its work. Even with aluminium mounting and Iris diaphragm the prices are not high.

Prices—

	¼ pl.	½ pl.	¼ pl.	12 × 10	[× 12
Brass mount, Waterhouse stops	£1 15 0	£2 0 0	£3 6 8	£6 5 0	£8 6 8
Aluminium and Iris	2 10 0	2 15 10	4 3 2	7 14 2	10 0 0



No. 139.

139.—**W.A. Rectilinear** (Loman & Co.)

The same remarks apply to the wide angle series.

Prices—

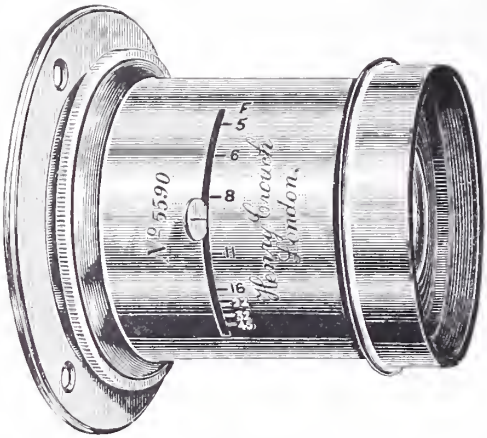
¼ pl.	½ pl.	¼ pl.	12 × 10	15 × 12
£2 1 8	£2 10 0	£3 15 0	£6 5 0	£8 15 0

140.—**Rapid Rectilinear** (Morley & Cooper).

Since the last Annual this firm have introduced a series of R.R. lenses fitted with a special form of Iris diaphragm. Judging from the one sent for trial, they are wonderfully good value at the

Prices—

¼ pl.	½ pl.	¼ pl.
£1 16 0	£2 9 6	£2 17 6



No. 141.

141.—**Hand Camera Lens** (Henry Crouch).

Largest working aperture, f/5. This lens is of new construction, and is made out of the Abbé Schott glass. It will cover a ¼-plate perfectly at open aperture.

Prices—5in. focus, £2 10s.; aluminium and Iris diaphragm, £3 15s.

142.—**The "Black Band" Portrait** (London Stereo Co.)

The portrait series (see page 385, Phot. An., 1891) are now being issued with rigid aluminium mounts, fitted with Iris diaphragm. This effects a considerable saving both in bulk and weight as compared with the old brass mounting and rack and pinion. The latter, too, is but little used, most of the focussing being done by the camera as a rule.

Prices are for the extra rapid series—

¼ pl.	½ pl.	1 pl.
£7 17 6	£12 12 0	£31 10 0



No. 143.

143.—**Detective** (C. C. Vevers).

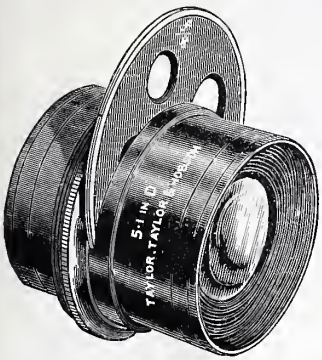
A special lens for hand cameras. It is a cheap rectilinear pattern, and some idea of its size will be gleaned from the fact that it only weighs with the flange ¾ of an ounce.

Price 8/6.

144.—**The "Optimus" Stereoscopic** (Perken, Son and Rayment).

These are new, of large aperture and short focus, for 3¼ × 3¼ stereoscopic work. They are also splendid for making lantern slides in the camera. They are, of course, sold in pairs, carefully matched.

Prices—Rapid rectilinear, f/8, £4; rapid Euryscope, f/6, £6.



No. 145.



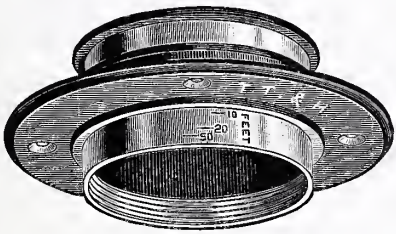
No. 146.

145 and 146.—**Detective Lenses** (Taylor, Taylor & Hobson).

This firm have added to their already extensive series of detective lenses No. 4, for quarter-plate, 5 inch focus, with wheel diaphragm as No. 145, and No. 3, 6 inch focus, Iris diaphragm, rack and pinion focussing as No 146. Needless to say, the lenses are thoroughly well finished, and capable of the best work. The complete series is now as follows:—

No.	Approx. Eq. Foc.	To Cover.	Full Aperture.	Waterhouse Diaphragm.	Iris Diaphragm.	Rack and Pinion Iris Diaphragm.
1	4in.	$3\frac{1}{4} \times 3\frac{1}{4}$	f/5.6	£3 0 0	£3 7 0	
2	5in.	$4\frac{1}{4} \times 3\frac{1}{4}$	f/5.6	3 10 0	3 17 0	£4 15 0
3	6in.	$4\frac{1}{4} \times 3\frac{1}{4}$ or 5×4	f/8	3 10 0	3 17 0	4 15 0
4	5in.	$4\frac{1}{4} \times 3\frac{1}{4}$	f/8		2 16 0	3 14 0
5	7in.	$6\frac{1}{2} \times 4\frac{3}{4}$ or 5×4	f/8			4 5 0
6	9in.	$6\frac{1}{2} \times 4\frac{3}{4}$ or 8×5	f/8			4 18 0

The No. 4 is the only one issued with wheel diaphragm, and the price for this particular one is £2 10s.

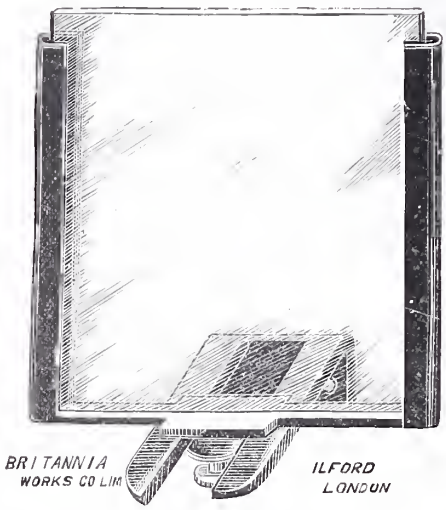


No. 147.

147.—**Flanged Focussing Slide** (Taylor, Taylor & Hobson).

A recent introduction, consisting of the ordinary flange with a sliding part into which all the D lenses of the firm will screw. They usually

engrave a focussing scale on the sliding tube of this flange and also on the sliding tube of the rack and pinion mount, giving a scale for the focus of objects at different distances.

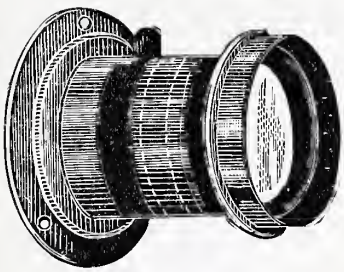


No. 148.

148.—**Isochromatic Plate Screen** (Britannia Works Co.)

One of the greatest difficulties in connection with the use of colour sensitive plates has been hitherto the obtaining of the yellow screen and its somewhat prohibitory price. Concurrently with the issue of the new Ilford isochromatic plates, the firm set to work to produce a screen that should be perfect and yet cheap. A sample is now before me, and it appears likely to meet the popular taste—and price. A neat case encloses the screen and framework, protecting it from damage when not in use. Two densities are issued, one requiring the exposure increased to the extent of 2½ times, and the other five or six times. The same frame does for both glasses, a groove in the framework admitting of instant alteration. A neat attachment at the bottom allows the screen to be moved nearer to, or further from, the camera front, in accordance with the amount of "heel" the lens possesses. The glass itself must be optically worked and free from flaws, otherwise we shall have distortion. It is quite plain, if the glass is wedge-shaped, that the rays will be interfered with; and, if the glass is either concave or convex, it will form a lens and interfere with the focus. It is wonderful how small a defect of this sort will throw the focus out to the extent of a quarter of an inch. If the screen has sides that are absolutely parallel, then we need not fear any danger. Even if the glass is not exactly parallel to the lens, no harm will be done beyond shifting more or less of the image out of the field, according to the angle at which the screen is inclined. The firm have taken every care to secure perfect glass.

Price 7/6.



No. 149.

149.—**The "Royalty" R.R.** (London & Paris Optic Company).

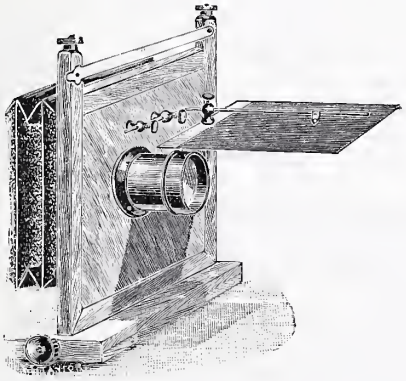
These have a neat arrangement, consisting of a metal ring, which slides up to keep the diaphragm in position, and preventing loss of the same. It also acts as a light and dust excluder, and as it takes up no room on the mount is a convenience without compensating disadvantages.

Price—½ pl. lens and ring, 30/-

150.—**Pinhole Diaphragm** (Photo Enterprise Co.)

A piece of metal, bored with pinholes from $\frac{1}{300}$ of an inch upwards. It is constructed to be inserted in the place of the ordinary stops.

Price 6d.



No. 151.

151.—**The "Universal" Lens Shade** (Marion & Co)

A neat appliance, which by two small screws can be attached to the camera front, and moved in any direction. The shade proper is made of thin light metal.

Prices—For lenses up to ½ pl., $6\frac{5}{8} \times 4\frac{1}{2}$, 2/-; for lenses up to ¼ pl., $8\frac{1}{2} \times 6\frac{1}{2}$, 3/-

PART III.

SUPPORTS.

TRIPOD STANDS. STUDIO STANDS. RESTS AND SUPPORTS.

The following were noticed in the "Photographers' Indispensable Handbook":—

Adjustable Sliding	Hulme	Large View	Marion	Studio	Marion
Ashford's Patent	Ashford	M.I.P.	Newton	,,	Shew
Ash	Dale	Girder	Lancaster	,,	Mason
Cheap	Lancaster	Portable	Underwood	Telescopic	Lucas
Crowe's Clip	Marion	Reversing Top	Stereo. Co.	,,	P S. and R
Cyclist	Watson	Shew's Clip	Shew	,,	Pumphrey
Cycle Clip	Lancaster	Sliding Leg	Newton	The 1887	Stereo. Co.
Four Jointed	Smith	Studio	Dale	Tripod Top	P S. and R.
Four Fold	Underwood	,,	Elliott	Umbrella	Dale
Kennell	Wratten	,,	Fallowfield		
Ladies'	Lancaster	,,	Lancaster		

The following were noticed in "Photography Annual," 1891:—

Studio Stands.		Tripods, &c.			
Elliott's		Alpenstock	Shew	Facile Carrier	Fallowfield
Fallowfield's		Bamboo	Adams	Gotz's Sliding	
Gem	Atkinson	,,	Park	Outdoor Table Top	Fallowfield
Lever	,,	,,	Shew	Repton	Preston
Magic	Atkinson	Camera Rest	,,	Stand Holder	Birm. P. Co.
Stepladder	Houghton	Club	Adams	Three Fold	Ashford
Watson'		Collapsible Head	Stereo Co.	Universal Clip	Shew
		Cyclists'	Vevers	Walking Stick	Adams
		Facile	Fallowfield	,,	Inkpen
				,,	Turnbull

152.—**The "Lothian" Adjustable** (A. H. Baird).

A metal stand which weighs 2½lbs., and when folded measures only 20 inches. It rises from 1ft. 8in. to 4ft. 9in., and will support a half-plate camera well.

Price, in canvas case, 15/6.

153.—**Scorer's Patent** (W. Scorer).

This stand has been designed to secure a rigid support for a camera or any portable aparatus that requires a very firm stand. The illustration will give a very good idea of its form when in use. The first was designed to support a large camera to take plates 24 × 30, and was found to answer. Being double all the way down to the shoe, and having two stretches and a divided intermediate piece, as illustrated, makes it more rigid than the old form of bow-leg, which was a good support but lacked portability. Each leg is folded together without removing anything, and has no screws to tighten. When folded, all are strapped together in a convenient shape, as illustrated at No. 8, fig. 3. The legs may be made adjustable for height, but this is not recommended, as it is found that even a comparatively thick piece, when single at the bottom of the leg, causes a loss of rigidity. The top has only two supports to each leg, making it easier to fix to a camera turntable or triangular head than one having four. It is found best to have as wide a separation as possible at the top, which makes the

stand firmer. It is also made to fit into thin steel plates in a thin circular mahogany board with a brass bush in the centre for fitting to camera of the ordinary construction.

Prices—Suitable for ¼ or ½ plate, £1 1s.; for ¼ plate to 12 × 10, £1 5s., for 15 × 12, and larger, £1 15s.

Extra for adjustable piece to alter length of legs, 7/6.



No. 153.



Fig. 1.



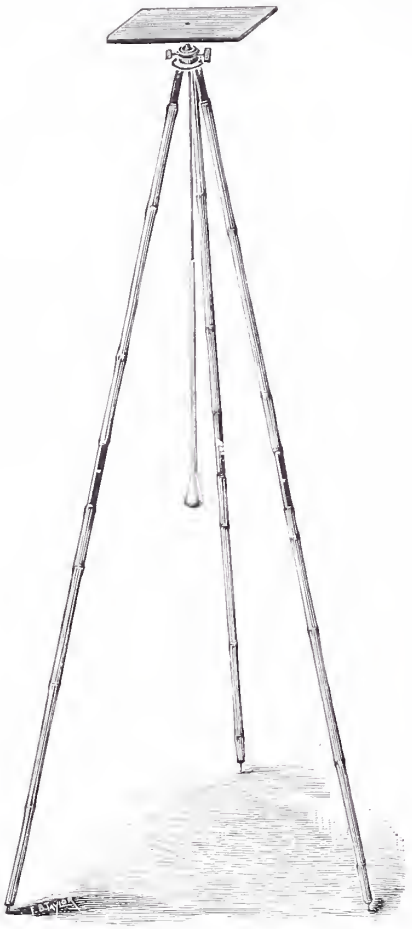
No. 154. Fig. 2.

154.—**The Walking Stick** (Talbot & Eamer).

A stand upon the split cane principle. When the ring and bottom fittings are removed, the stick opens out into three pieces. These are kept

apart by three brass pieces, which catch into a central rod, as will be seen by the illustration. In the top is a sliding rod, fixed at any point by a screw. The height of the stand itself is three feet, and the sliding rod gives anotber eight inches. It is well made and very rigid.

Price 16/-



No. 155.

155.—**The Bamboo** (Henry Park).

In general style it resembles the one described on page 405, Phot. An., 1891, but possesses marked advantages in the direction of rigidity. A counterbalance is now fitted, consisting of a brass rod with a thick end hanging down in the centre. This is made in two parts, one sliding over the other, so that it does not interfere when the legs are jointed, as described on page 405. This balance is a great help in the direction of rigidity, and being connected directly with the ball joint, has necessitated a slightly different form of head, as the screw underneath is not possible. I have no

hesitation in saying that this tripod is the most rigid of its kind I have ever used.

Prices vary according to sizes—

Diameter of head.	Weight.	Height.	s.	d.
1⅜in.	13 ozs.	47in.	6	0
2½in.	21 ozs.	47in.	7	6
3in.	25 ozs.	47in.	11	0



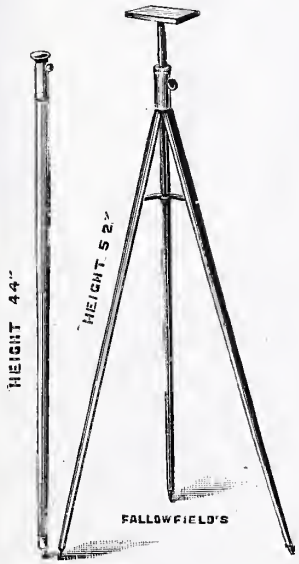
No. 156.

153.—**Walking Stick Stand** (J. Lizars).

A neat and compact little stand for hand camera work, or for occasional use with a ½-plate camera. When closed it resembles an ordinary walking stick, and is a suitable length for carrying in the hands.

Price 15/-.

Extra.—Lengthening piece, 1/6.



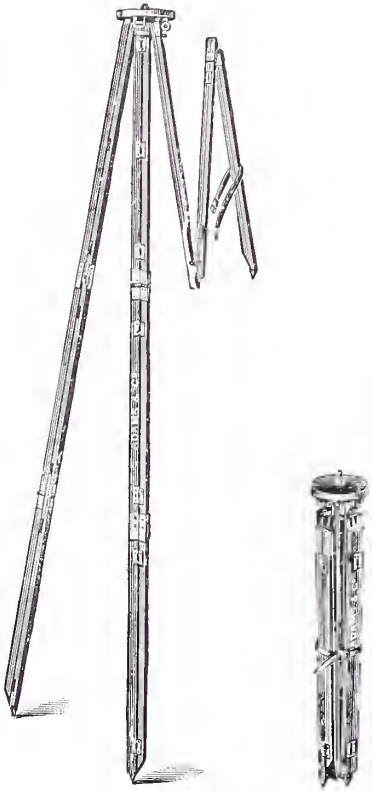
No. 157.

157.—**The "Stick"** (J. Fallowfield).

This is slightly heavier than No. 160, and is fitted with springs into head, thus rendering same always closed when not in use, and also making stand very rigid when in use. The weight is 1¾lbs.

Price 13/-

Extra.—Platform top, 2/



No. 158.

158.—**The "Lightning"** (Adams & Co.)

Tripod stands do not afford, at all events now, much scope for the ingenuity of our enterprising photographic caterers. But certainly during 1891 the "Lightning" was the greatest effort in this direction. When folded ready for transit it measures 20 inches in length, and weighs 2¼lbs. All that it is necessary to do in preparing for work is to grasp the top, hold it at arm's length, and allow the joints to fall, when it immediately erects itself into a rigid stand. I don't know what more we can want, unless it is one that folds into our waistcoat pocket and becomes a 9ft tripod by simply swearing at it. The material used is polished walnut with brass and steel fittings. Erected ready for use, it stands 4ft. 4in. high. There is not a single screw, spring, or catch of any kind that requires adjustment, and it literally erects itself *instantaneously*, and is closed as readily. Each leg when folded is flat, but when open becomes a rectangle.

Prices—½ plate, 21/- ; ¼ plate, 27/6.



Fig 1.



Fig. 2.

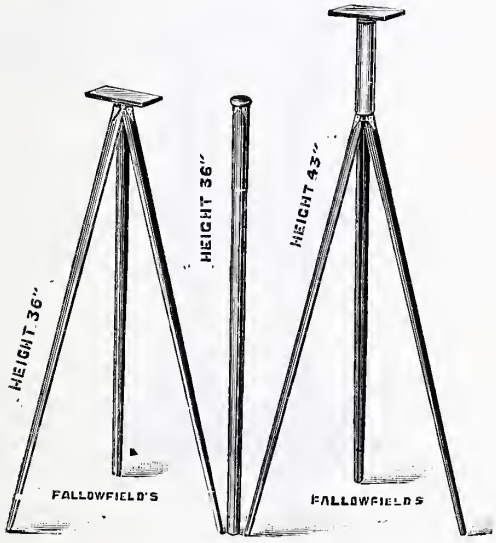
No. 159.

159.—**Ashford's** (J. Ashford).

As I have personally used this stand for four or five years I cannot really describe it as new. But an improvement has been made during 1891, which calls for a notice. The only weak point hitherto, so Mr. Ashford says, has been in the centre between the sliding portion. That has been materially strengthened by the insertion of a longer piece of wood, and the stand is therefore now stronger than ever.

Prices (two-fold, fig. 2)—4 feet, 4 inch top 18/6, 6 inch 21/-, 8 inch 25/-; (three-fold, fig. 1) 6 inch 25/-, 8 inch 30/-

Extra.—Waterproof case, leather bound, with straps, 5/-

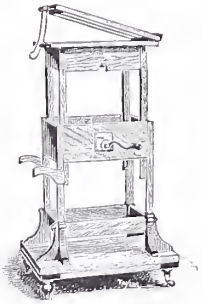


No. 160.

160.—**The "Walking Stick"** (J. Fallowfield).

A stand devised for use with hand cameras when occasions arise for prolonged exposures. The first illustration shows with platform top without extension barrel, and is a good convenient height for all general purposes. The centre shows same closed as a walking stick, and third illustration shows it giving full height with extension part fitted. The different heights are shown in the illustration. It is very readily got ready for work, and, considering its lightness in weight (1½lbs.), is very rigid.

Price 21/-

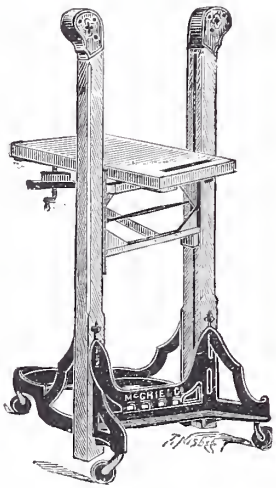


No. 161.

161.—**The "Rigid"** (H. Grayson).

A studio camera, in which considerable thought has been expended in the direction of rigidity. It is made of solid birch, and though heavy, is very easily moved about. The lowering and raising is on the web principle. The castors at the front feet work upon wheel bearings, and this helps the movement. Another good feature is that the weight is chiefly in the lower portion of the stand.

Price for 12 × 10 or 15 × 12 cameras, £5 5s.

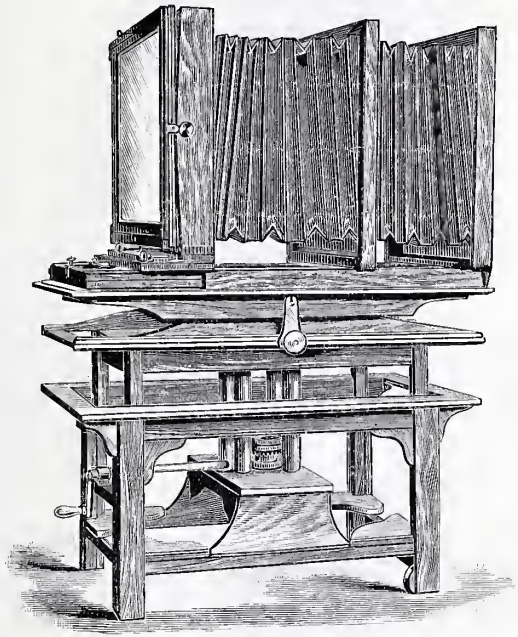


No. 162.

162.—The "Semi-Centennial" (McGhie & Co.)

A studio stand of American design, I believe. It goes down very low indeed; in fact, to within 13 inches of the floor. The rubber wheels make the movement of it about the studio very noiseless indeed. By the use of coiled springs, actuated by a key, the weights of different cameras are counterbalanced. It is handsome in appearance, though differing from our usual stands.

Price £6 6s.



No. 163.

163.—Large Studio Stand (Marion & Co.)

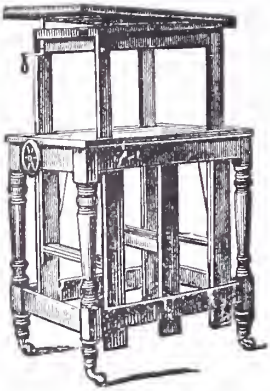
A special stand for very large and heavy cameras, made of Spanish mahogany, polished. The mechanical power is a central worm screw working in four racks on pillars, which allows of the heaviest cameras being raised or lowered with great ease. There are two castors on front legs by which the stand may be moved about readily, and yet it is very firm when fixed at one spot.

Price £20.

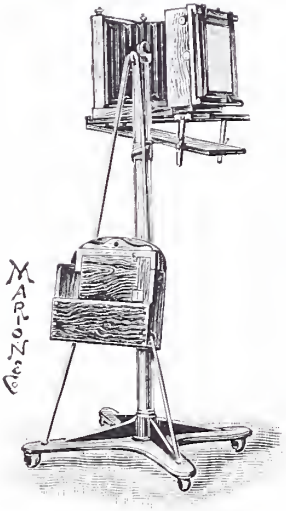
164.—Automatic Studio Stand (Mason & Co.)

Though not exactly a new introduction, it has been improved greatly during 1891. It is simple in action, effective, and very steady. It is free from screws and cogs, and moves up and down quickly and easier than any other make of stand. The raising and lowering is arranged by weights, and it can be fixed at any height desired. Tilting arranged by screw, as shown in cut.

Prices—Small size, top 23 × 15, to rise to 48in., and lower to 34in., £4 10s.; larger size, top 28 × 16, to rise to 54in., and lower to 36in., £6.



No. 164.



No. 165.

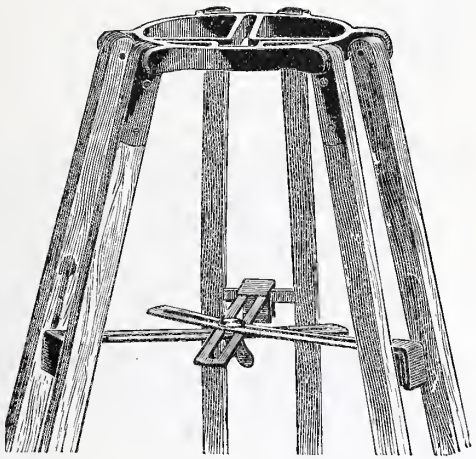
165.—**Buttrum's Pedestal** (Marion & Co.)

This is quite a novelty in studio stands. The advantages claimed for it are that it can be raised and lowered very quickly, and placed very low for children; it is very light and easily moved about; the platform carrying the camera swings round the pedestal easily, and can be fixed instantly.

Price £6 13s. 6d.

166.—**Tripod Stand Securer** (Mason & Co.)

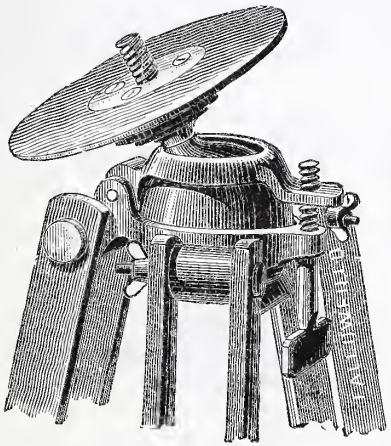
This neat little piece of apparatus met with considerable attention at the Glasgow Exhibition. It possesses the advantage over cords and straps, that it holds the tripod secure both ways, either from closing or extending. The woodcut illustrates it at a glance. The brass rules draw out or move in to any given point, at which they can be screw-tightened, and made as



No. 166.

rigid as a solid stand. It can be adapted to any aize of stand. It is fixed without trouble or delay. For interiors, smooth floors, on the hillside, in streets, or any like awkward places where the tripod can only be fixed with difficulty, this ingenious appliance will render the tripod and camera secure, and make failure through slipping impossible. The brass slides are 7½in. long; the set complete weighs 6ozs.

Price 5/-



No. 167.

167.—**Cup & Ball Head** (J. Fallowfield).

An improvement on previous universal movement heads for small cameras. It is well finished in mahogany with nickel-plated fittings.

Price 7/6.

PART IV.

APPARATUS AND ACCESSORIES USED BEFORE EXPOSURE.

ACTINOMETRY. MAGNESIUM LIGHT. BACKGROUNDS. STUDIO ACCESSORIES.

The following were noticed in the "Photogaphers Indispensable Handbook":—

Actinometer ...Green & Fnidge
" ...Mason
" ...Stanley
Photometer ...Taylor
Lawn Studio.. ...Houghton
Woollen Background ... ...Besser
Backgrounds.. ...Redshaw
Amateur Head Rest..
Magnesium Lamp ...Lancaster
" " ...Fallowfield
" " ...Mason

The following were described in "Photography Annual, 1891":—

FLASH LIGHTS.

Aptus Lamp ...Sbarp
"Autocrat" Magazine ... ...Martin
Book upon Flashlight ... ...Marion
Challenge Lamp ...Adams
Economical " ...Marion
England's " .. Fallowfield
Farleigh " ... "
Flash Pistol... ...Vevers
Hastings Lamp ...P. S. & R.
Hibbard Repeater...Fry
Hinton's Lamp ...
Imperial " ...Fallowfield
James's " ...
Leisk's Centrifugal..Marion
Optimus Ribbon ...P. S. & R.
Redwood's Lamp ...Marion
Repeater " ...Adams
Simplex " ...Platt
Slingsby's Lamp ...Marion
Watson's Repeater..
Vevers's Lamp ...

ACTINOMETERS, &c.

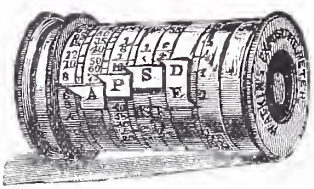
Actinograph ...Hunter
Ballard's Actin. .. Spencer
Bijou " ...Watts
Comb. Actin. and Level ... ...Stanley
Photometer ... ...Stereo Co.
Photo Compass ...Blackfriars
Watkins ... ...Haines

BACKGROUNDS.

Alto-relievo ... ...Lund
Amateur Box ...Redshaw
Frames for ... ...Houghton
Graduated Amateur.Scholzig
" Woollen.Marion
Graduated ... ...Lund
Various ... ...Adams
" ... ...Lund
Washable ... ...Dyson

STUDIO ACCESSORIES.

Balustrade ... ...Fallowfield
Staircase ... ...Elliott
Chair ... ...Adams
" ... ...Marion
Child Basket ... "
Head Rest ... ...Harrison
Head Screen ...Tylar
Light Reflector ...Marion
Balustrade ... ...Elliott
Portable Studio ...Houghton
Screen ... ...Marion
Stone Seats ... ...Fallowfield
Table ... ...Elliott
Univ. Furniture ...Fallowfield
Window ... ... "



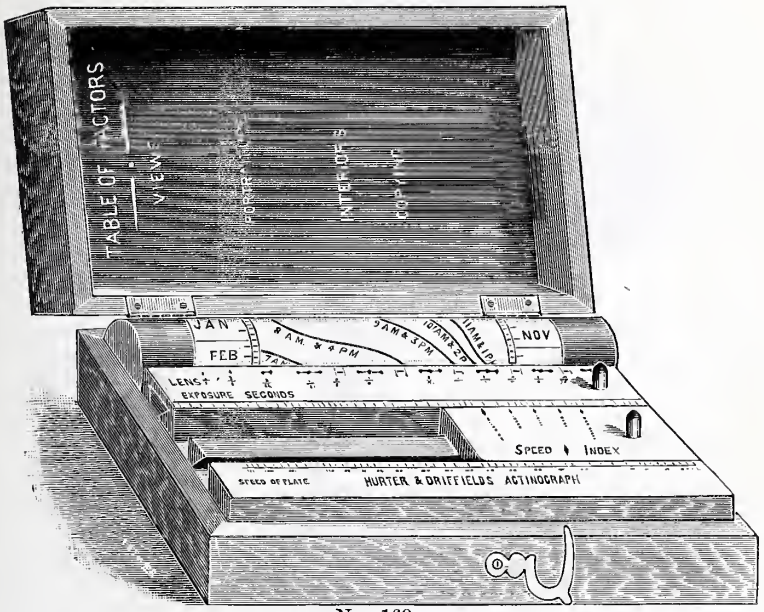
No. 168.

168.—The "Watkins" Exposure Meter (FIELD & Co.)

Since PHOT. AN., 1891, this instrument has been improved by having the scales extended on the "subject" and "actinometer" rings, as many workers find that in most cases they use the same brand of plate, diaphragm, and subject number, only the A or actinometer pointer remains to be set for each exposure. It has, therefore, been placed last in order

instead of first as formerly, and can now be set without affecting the position of the other scales. The refills for the instrument being in great demand, each one is sealed up in a metal capsule in presence of chloride of calcium, and the sensitive paper can now be guaranteed to reach the user in whatever climate without deterioration.

Price 15/3, or with extra ring for enlarging, 18/3.



No. 169.

169.—**The Actinograph** (Marion & Co.)

This excellent instrument has in the hands of this firm taken what might be termed almost a new lease of life. And although pretty fully dealt with in Phot. An., 1891, page 415, for two reasons it must be dealt with again.

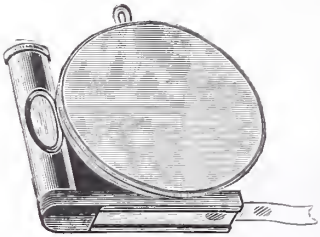
(1.) It has been adopted by Messrs. Marion & Co., and in future all their plates will be issued with an absolutely correct exposure number on each box. The firm have satisfied themselves that the system is thoroughly reliable.

(2.) It is now issued at a much reduced price.

An extract from the circular issued is worth quoting :—

"It must be distinctly understood that each Actinograph can only be used with accuracy within a certain range of latitude north or south of that marked on the instrument. The actinograph provided with light-diagram for north latitude 52° 30′ is no doubt sufficiently accurate for the whole of England and Ireland, but it would become more and more unreliable as we go farther north and south of this latitude. As, however, its unreliability would be chiefly felt in the earlier and later hours of the day and in the winter, the Actinograph will serve for a more extended range of latitude if the photographer confines his work to the middle of the day and to the summer months. Actinographs may be specially ordered with light-scales for any desired latitude."

Price 10/6.

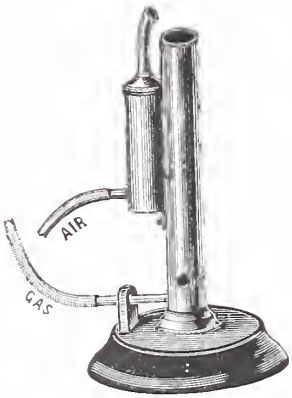


No. 170.

170.—**Combined Actinometer and Spirit Level** (W. F. Stanley).

See Phot. An., 1891, page 419. This has been altered in shape and generally improved.

Price 10/6.



No. 171.

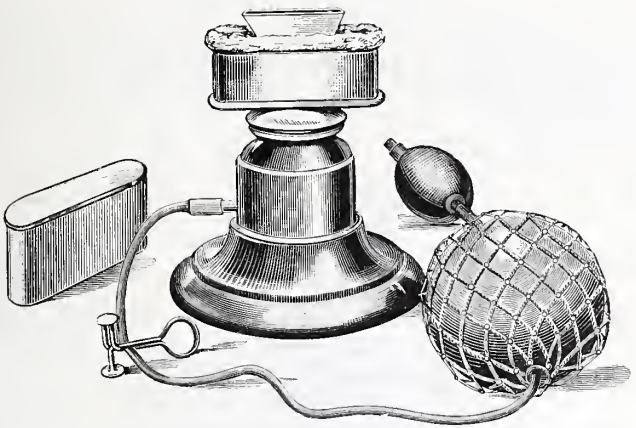
171.—**The "Ajax" Flash Lamp** (Photo Enterprise Co.)

A new lamp for use with gas. The magnesium is stored in a brass chamber, to which is attached a tube (in the illustration marked "air"), and by pressure on the ball the amount of magnesium sent through the flame is regulated, so that either a small or large flash can be made, and as the reservoir is large, a succession of flashes is under control. The gas part of the apparatus has inlets for air, making the flame given very like that of a Bunsen burner. This tends toward more complete combustion.

Price 7/6.

172.—**The Todd-Forret Flash Lamp** (A. H. Baird).

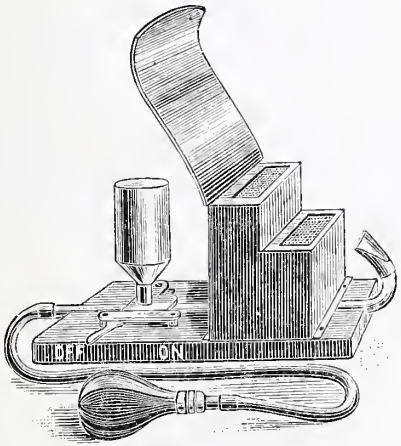
From the illustration it will be seen that the wooden bottom forms the reservoir for the powder. Above this is arranged an oblong lamp, which burns in the usual way spirits of wine. In the centre of this is a long slot in the centre of the flame, through which is blown the magnesium. The blast is a continuous one or a flash, just as desired. The continuous action is proved by the large bulb something like a toy balloon, which is inflated by the small ball at the end of the tube. Upon the tube will be seen a finger-clip, and a slight pressure upon this allows the air to pass through the reservoir of powder in a downward direction, driving the magnesium through the flame. The effect is an extremely powerful light, and as by means of a screw-clip (not shown above) compressing the tube



No. 172.

the amount of air passing through can be regulated, independent of the pressure upon the finger-clip, it must be obvious how much the light is under control. It is one of the best lamps I have ever tried, and is certainly one of the cheapest.

Price 12/6.



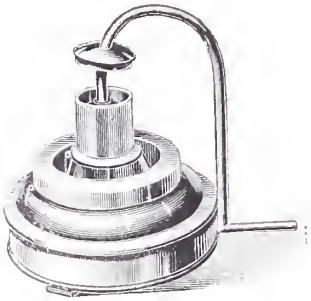
No. 173.

173.—**The "Excelsior" Flash Lamp** (W. Rooke).

Introduced this year, and one that works very well indeed. The powder is placed in a cone-shaped receptacle at the back, and as this is merely a storage chamber, 90 to 100 charges can be therein placed at one operation. A small lever, moved to and fro, allows a charge of about five grains to fall into position in the tube. Spirits of wine is used upon two gauze pads, and upon squeezing the ball the charge is blown very exactly through the flame. As I was asked for a "really practical trial," the camera was lugged into the editorial den and exposures made upon 60 times Fry celluloid films, the resulting negatives being really excellent. The lens

was a portrait combination working at f/4. The trials made convinced me that as far as light was concerned Mr. Rooke's lamp is decidedly good, and the convenience of merely moving a lever to place another charge in position is obvious.

Price £1 5s.

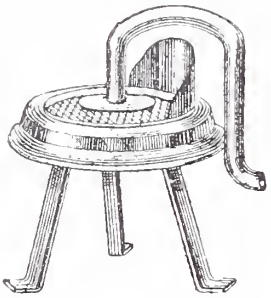


No. 174.

174.—**The "Blow-down" Flash Lamp** (Marion & Co.)

This lamp consists of a cylinder closed at the top and bottom, having inside it another cylinder of smaller dimensions. The outer cylinder at the bottom is pierced with small holes all round the circumference. A pipe, connected with a pneumatic ball and tube, is conveyed through these two cylinders, and by it a pressure of air forces the magnesium powder through the holes at the bottom of the cylinder; thus a circular spray of magnesium powder is forced into the flame of the lamp. The magnesium is between the two cylinders, which space forms a reservoir of powder sufficient for several discharges, and this reservoir, being in the centre of the flame, is kept warm and dry, thus materially aiding thorough combustion of the powder. After the flash, the return rush of air does not draw the magnesium into the air-tube, but it is drawn up into the cylinder against the dome-shaped cover, and there falls down again into its proper place ready to be expelled at the next pressure of air; thus the clogging of the air-tube is prevented.

Price, which includes ball and tube, 10/6.



No. 175.

175.—**The 1892 "Aptus" Flash Lamp** (Sharp & Hitchmough).

A cheap little spirit lamp of improved design.

Price, complete with rubber tube and ivory mouthpiece, 1/6.

176.—**The "Nadar" Flash Lamp** (London Stereo Co.)

A continuous principle lamp of handsome appearance. A reservoir in the base of the lamp is filled with magnesium powder, which is projected through a circular wick by means of a double indiarubber ball. Single flashes may be given, or the exposure may be terminated at any time by means of a small tap in the rubber tube.

Price £1 11s. 6d.



No. 177.

177.—**The "Champion" Flash Lamp** (Griffin & Sons).

A simple and cheap lamp. The funnel having been charged with powder, the spirit lamp is lit and the powder blown through the flame. Two or three lamps can be operated at one time by means of the connecting piece, and will give sufficient illumination to take large interiors or groups.

Price 1/6; connecting pieces 8d. each.

178.—**The "Autocrat" Magnesium Magazine** (G. S. Martin).

See Phot. An., 1891, page 425. The new feature is a patent top, which can be screwed off the body, if desired, for refilling, packing, &c.

Price 1/6.

179.—**Accessories** (Oscar Scholzig).

A magnificently-illustrated book of nearly 400 pages, containing photo-mechanical reproductions representing the accessories and furniture manufactured by the Dresden Art Furniture Company, is sent to me by Mr. Scholzig, who is their sole agent. The collection is so vast, both in extent and variety, that it is only possible to mention the catalogue. But anyone desiring to obtain good accessories should make a point of looking over it.

180.—**Graduated Woollen Backgrounds** (Oscar Scholzig).

These are not new, but considerable reductions have been made in the price list, which is now as follows:—

5	feet wide	5/9	per yard.
6½	,, ,, ...	7/-	,, ,,
8	,, ,, ...	8/3	,, ,,

181.—**"Aptus" Washable Backgrounds** (Sharp & Hitchmough).

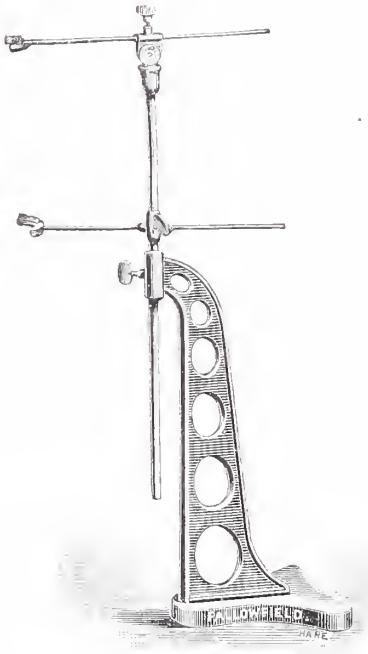
In flatted oil, plain and graduated, various colours, mounted on rollers top and bottom. The graduated series are plain on one side, being so to answer the purpose of two backgrounds.

Size.	Plain.	Graduated.
50 × 40	2/6	5/-
60 × 40	3/-	5/6
70 × 40	3/3	6/-
70 × 60	4/9	8/9
72 × 72	5/6	9/9
90 × 72	6/9	12/-
96 × 96	—	21/-
108 × 72	7/9	24/-

182.—**"Aptus" Woollen Cloth Backgrounds** (Sharp & Hitchmough).

Plain and graduated, mounted on rollers top and bottom.

Size.	Plain.	Graduated.
ft. ft.	£ s. d.	£ s. d.
8 × 6	1 1 0	1 13 0
8 × 7	1 4 6	1 18 6
8 × 8	1 8 0	2 4 0



No. 183.

183.—**Improved Head Rest** (J. Fallowfield).

The illustration shows a new head and body rest for studio work. It is made in three patterns:—

For children	£0 15 0
,, adults	1 0 0
,, ,, (as illustrated)	1 5 0



No. 184.

184.—**Combined Chair, Body and Head Rest** (J. Fallowfield).

This has a movable seat, which can be adjusted to suit various heights. The seat is upholstered in crimson velvet. It should be a very useful studio accessory.

Price £3.

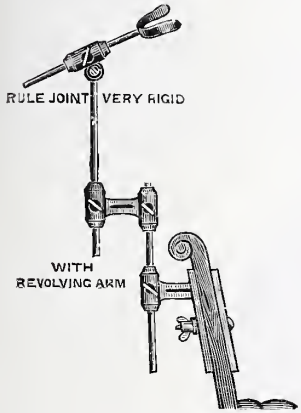


Fig. 1.

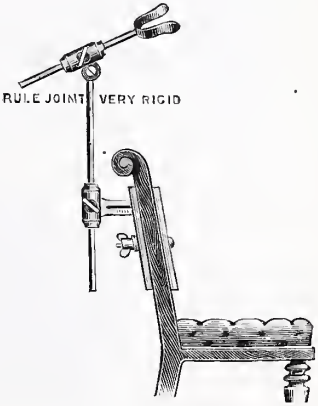


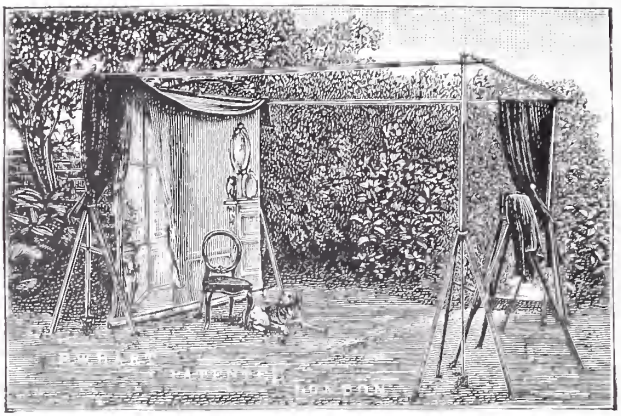
Fig. 2.

No. 185.

185.—**Chair Head Rests** (Jas. Harrison & Sons).

Mr. Harrison, finding that there was a demand for a more simple kind of rest than his ordinary one, has designed several forms of a less expensive kind, and the old-fashioned chair back rest is now presented as a very efficient instrument, to which he has also adapted his rule joint, which forms an important feature. Fig. 1 shows the pattern with revolving arm, and fig. 2 the plainer and more simple make.

Prices—No. 1, 10/6; No. 2, 7/6.



No. 186.

186.—**Lawn Studio** (F. W. Hart).

An arrangement for outdoor portraiture, suitable for the amateur in his back garden or yard, and for occasional use by the professional away from home. It consists of fourteen or more bamboo canes connected with standard screws of wrought iron and brass fittings. It is so arranged that it can be readily extended by the addition of more canes. The illustration shows the No. 2 pattern.

Prices—No. 1, suitable for a background 7ft. 6in. × 5ft. 4in., packed in case, three unbleached curtains, £4 10s.; No. 2, 11ft. × 7ft. 6in., with ten curtains, £7 16s.

Extras—No. 2, 15ft. long, £8 12s.; extra canes, with end screws, 2/6 each.

PART V.

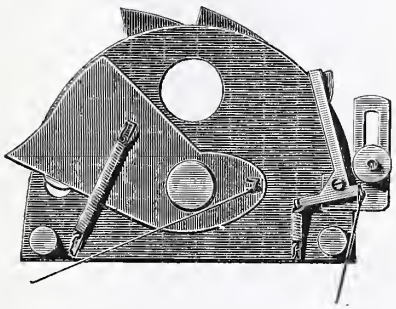
SHUTTERS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Cadett's Drop
Cadett's Pneumatic
Dewey's Drop
Due Ratio
Diaphragmic
Ebonite Drop
Eclipse
Economic
Elliptical
Evolute
Furnell
Grimston
Guerry
Heath
Instantograph
Kershaw
Leicester
Lightning
Marshall
Mayfield
Metal Drop
Paragon
Phantom
Place's
Plunge
Phœnix
Repeat
Right About Turn
Sands Drop
,, Ordinary
,, Patent
Sargeant
Simplicity
The 1887
Two Shilling
Waterloo
Watson's Double Snap
Watson's Snap ,, Drop
White's

The following were described in "Photography Annual," 1891:—

Automatique ...
Beck-Newman ...Beck
Between Lens ...P. S. and R.
Blind ... ...Vevers
Caldwell ... ...Wray
Celeritas .. ...Adams
Chronolux ... ...Lancaster
,, (1890) ... ,,
Crown ... ...Marion
Dolce ... ... ,,
Drop... ... ...Fallowfield
,, ...Vevers
Elmo. ... ...Cusworth
Foreground ...Thornton
Gem... ... ...Dewey
Inside ... ...Thornton
Instantaneous ...Thornton
Instantolux... ...Underwood
Iris ... ...Gotz
Leisk's ... ...Marion
Mattioli ... ...Shew
Newman's Studio...Adams
Nordern Flap ...Mitchell
Pneumatic ... ...Lancaster
,, Return..Mitchell
Regent ... ...Robinson
Repeat ... ...Shew
Roller ... ...Fallowfield
Sea-Saw ... ...Lancaster
,, (Oval) ... ,,
Self-Portrait ...Tylar
,, ...Underwood
Shutter Chronograph Paget
Simplex Drop ...Preston
Special ... ...Thornton
Speed Indicator ... ,,
Stanley's ... ...
Stereo Company's...
Stereoscopic .. Lancaster
,, ...Gotz
,, ...Thornton
Studio ... ... ,,
Time ... ... ,,
Volute ... ...Gotz
Window ... ...Tylar
Wing... ... ...Gotz
X.L. ... ...Underwood

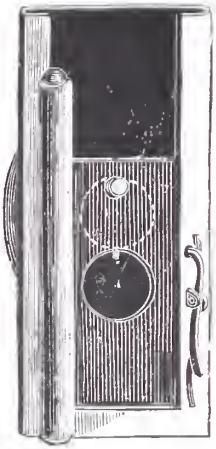


No. 187.

187.—**The "Hand Camera"** (Marion & Co.)

A neat metal shutter for use in hand cameras, and is the same as that in the firm's well-known "Radial." The covering shield admits of its being set without uncovering the plate. Complete with eyelets, buttons and cord.

Price 12/-



No. 188.

188.—**Metal Drop** (W. Tylar).

This shutter is constructed entirely of metal. It is light, portable, and durable, and is actuated by a spiral metal spring in a tube at the side of the shutter, and works equally well in any position.

Price from 3/6 each.

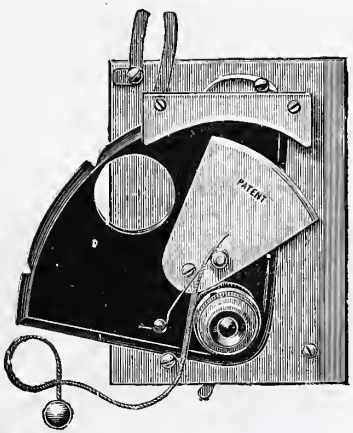


No. 189.

189.—**The "All Round"** (W. Tylar).

This is another metal shutter, giving a prolonged exposure to the foreground. The action is up and down, without vibration. To set it, the small knob is pulled round the semi-circular slot to the right-hand side, this knob being fixed to a plate actuated by a spring. On the trigger being touched the plate to which this knob is attached returns to its original position, with the result that the slab in front of the lens is rapidly lifted up and returned. It is a very small shutter, a ¼-plate one being only three inches in length and one ounce in weight. There appears to be no jerkiness during exposure, but a steady, continuous action.

Prices—¼ pl., 5/6; ½ pl., 8/6; ¼ pl., 12/6.

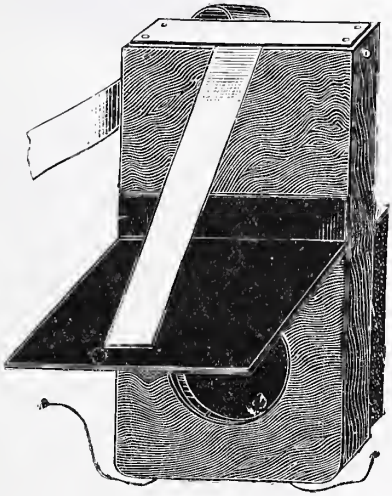


No. 190.

190.—**The "Safety"** (W. Tylar).

This is a safety shutter for detective cameras. So many amateurs now-a-days are handy with their tools, and like to make their own hand cameras, that it is well to know where to get a suitable shutter for them. The one shown here is well made of brass and ebonite, and has a safety shield that covers the aperture during the time the shutter is being set. It is released by a bar projecting through the side of the camera; it is a quick and good shutter, well made in every respect.

Price 6/-



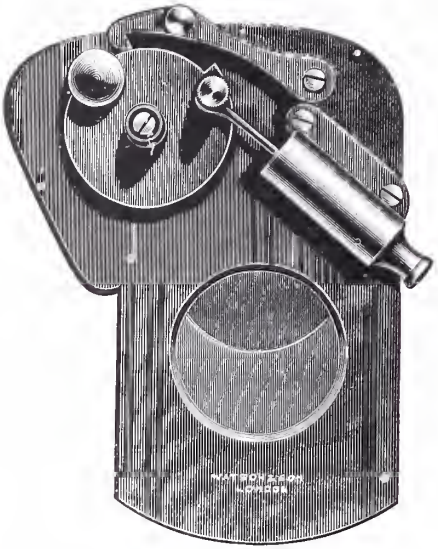
No. 191.

191.—**The Sky Shade Window** (W. Tylar).

Curtain shutters are simple and effective. They are always set, and not likely to get out of order when properly made. They render a cap un-

necessary. The foreground has the longest exposure—just what is so necessary. With the sky shade attached, to shield the lens from the sun's rays, this shutter should satisfy anyone for ordinary purposes. It is time and instantaneous as well. A cork back is attached so that by the aid of a penknife it can be fitted to the lens hood. It is well made in mahogany, with leather sky shade.

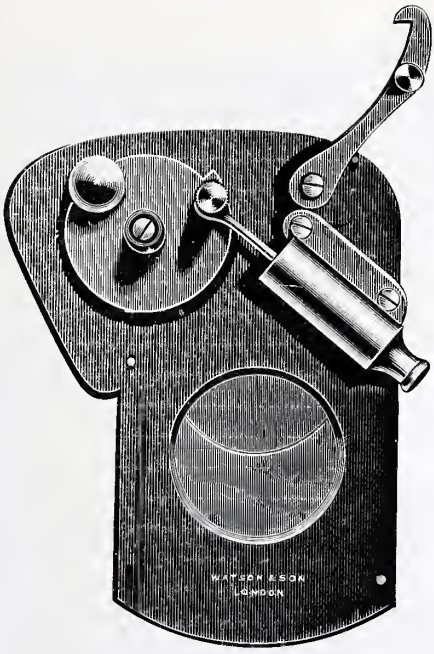
Prices—2in. back, 4/6; 3in. back, 7/6.



No. 192. Fig. 1.

192.—**The "Acme"** (Watson & Sons).

A new shutter, made throughout of metal, and without springs. It should be an exceedingly useful tool in hot climates, and another feature that will be appreciated is that the whole of the working parts are in full sight outside. By means of the illustration and the following description, some idea of it may be gained It consists of a lower metal sheath and upper metal case, the former containing two differently formed sliding plates passing over each other, opening and closing in the centre, but regulated in such way that the opening and closing are exceedingly rapid motions, and the longest period of any exposure (however short that exposure may be) is obliged to be while the shutter is fully opened; this is done by means of the pin that opens and closes the shutters running in a slot made to a certain curve; at the moment of starting it opens the shutter, then traverses the length of the slot, and on reaching the other end closes the shutter. The speed for instantaneous work depends upon the suddenness of the pressure given to the pneumatic ball; the pneumatic being the only motive power, there are neither metal nor elastic springs to get out of order, and the sharper the ball is pressed the quicker will be the exposure. The pneumatic power is attached to a revolving disc, and over this is placed a loose pawl, to use for timed exposures; if this is dropped on to the disc it engages with it and causes it to stop when the shutters are fully open, and by keeping the ball compressed the shutter remains open at the will of operator; by relaxing the pressure the shutter instantly closes. For instantaneous work the pawl is thrown back, as shown in fig 2, and



No. 192. Fig. 2.

then a sharp pressure on the pneumatic ball causes the revolving disc to pass fully over, and suddenly open and close the aperture. It is so balanced in its working parts that it closes itself either way, with the piston up or down, and as all the mechanism is outside, it is seen at a glance whether the shutter is opened or closed, and for focussing it is only needful to drop the pawl on to the disc and revolve the latter by the finger to engage with it. The shutter can be worked without using the pneumatic by a slight touch of the finger on the pneumatic pin. The pawl acts as indicator whether the shutter is set for time or instantaneous; for the former it stands *up* vertically, for the latter lies down horizontally. The shutters are made with tube fittings at back to push on to the fronts of lens; it is recommended to fit them directly on to the tube of lens, and not on the hood. It works very smoothly, and is so simple, the description above notwithstanding, that it will doubtless be much sought after.

193.—**Micklewood's** (E. H. Micklewood).

A new exposure apparatus, enabling landscapes to be taken with the existing cloud effects portrayed on the negative, avoiding dodging of any sort in printing. The results I have seen (negatives and prints) are really magnificent—in fact, the finest I have yet inspected. Moreover, they are plain landscapes, not seascapes; in fact, one is a plain view of a house and garden. The apparatus consists essentially of a dark chamber and shutter combined, the chamber being interposed between the lens and the shutter. The latter has a rising and falling motion where applied before the lens, or the reverse if used behind. The shutter itself is actuated by a pneumatic ball, and is completely under control, a variety of exposures being given at will. The general plan would be to form the dark chamber with a small flexible bellows, which is attached by simple means, by preference, to the

camera ; it is supplied with means of stiffening same, and of setting the shutter at varying distances from the lens, according to the focal length of same, and when removed the whole collapses so as to occupy a very small space. As applied to hand cameras it will, where practicable, be placed behind the lens, and will be essentially an instantaneous shutter only. As an illustration of size and distance, a 6 inch focal length lens requires shutter to be about $1\frac{3}{4}$ inches from front of it, and the apparatus, when fully extended and in use, is about a quarter size of the camera. This may sound very large, but as a matter of fact it does not look particularly so, and when the results are looked to I should say great numbers will consider that first. It does its best work when used fairly slow, and with a comparatively small stop in the lens, say f/22. It is not a high speed shutter, about $\frac{1}{10}$th sec. to any length exposure. The mode of attachment is by means of a small plate affixed by small screws to lens mount, and the apparatus fits on with a bayonet joint, so as to be readily attached or removed, and is quite firm when on.

Prices—$\frac{1}{4}$ pl. and 5 × 4, 25/- ; $\frac{1}{2}$ pl., 30/- ; $\frac{1}{1}$ pl., 35/-



No. 194.

194.—**The "Mignon"** (W. B. Whittingham & Co.)

A small and compact shutter, with an opening and closing movement from the centre. It can be used for either time or instantaneous exposures by the movement of a lever at the side. By an adjusting screw the flange of the shutter contracts or expands so as to accurately fit any lens of ordinary dimensions. The $\frac{1}{2}$ plate shutter measures 3in. × $2\frac{1}{8}$in. × $\frac{1}{2}$in., and the $\frac{1}{4}$ plate $2\frac{1}{4}$in. × $1\frac{3}{4}$in. × $\frac{1}{2}$in.

Price, with ball and tube, 20/-.



Negative by J. McALLUM.

THE SILVER STRAND. LOCH KATRINE.

Graphotone Print, by THE GRAPHOTONE CO., Bush Hill Park, Enfield.



No. 195.

195.—**The "Snap Shot"** (Thornton-Pickard Manufacturing Co.)

This is a cheap and efficient form of blind shutter. The speeds can be varied by hooking the ring on to the different pegs; there is no vibration. To set for focussing, the pointer is moved to F and the cord slowly pulled.

Prices—	1½in.	2in.	2½in.
With button release	6/6	8/6	10/6
With pneumatic release as well	8/-	10/-	12/-



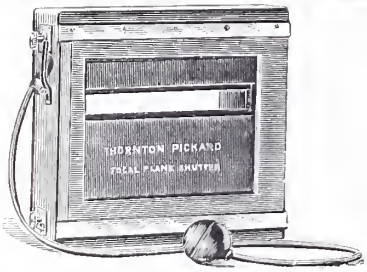
No. 196.

196.—**The "Safety Snap Shot"** (Thornton-Pickard Manufacturing Co.)

This is like the shutter previously described, but is fitted with the new safety blind. This automatically covers the aperture whilst setting the shutter for the next exposure, and then flies back, leaving the shutter ready for release. It is an excellent thing for magazine cameras. It is also useful with ordinary cameras, as in case one forgets to set the shutter before drawing the slide, there is no need to push it in again to cover the plate whilst doing so. This is probably the first roller-blind shutter which admits of this convenience.

	1½in.	2in.	2½in.
Prices—Button release	10/-	12/6	15/-

Extra—Pneumatic release, 2/6.



No. 197.

197.—**The Focal Plane** (Thornton-Pickard Manufacturing Co.)

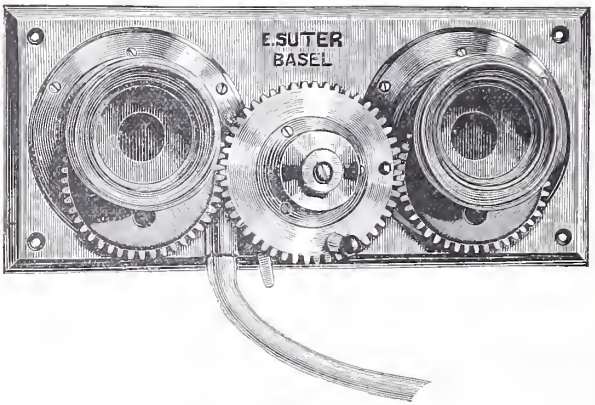
This has been introduced to meet a growing demand for a shutter that will give extremely short exposures. It can be made to give $\frac{1}{1000}$ of a second, or even faster to order. It works next the plate, and is of the usual roller blind type. It fits into the back of the camera in place of the ordinary dark slide, and is fitted with grooves to receive the slides. A special focussing screen is also provided.

Prices—	¼ pl.	½ pl.	¼ pl.
	£1 15 0	£2 5 0	£3 0 0

198.—**Time Shutter with Safety Blind** (Thornton-Pickard Manufacturing Company).

The blind arrangement, as in No. 196, can be fitted to the firm's standard time and instantaneous shutters (but not to shutters previously purchased), at an extra cost of

Prices—	2½in.	3½in.	5in.
	5/-	7/6	10/-



No. 199.

199.—**Suter's Stereoscopic** (J. R. Gotz).

Last year this was received only just in time to be included (see Phot. An, 1891, p 470). Since then, however, it has been improved in several little points. The discharger is now underneath, and a pneumatic release is also added. I can say but little more than I did then, that it is a magnificent piece of workmanship

Price—£9; with pneumatic release, £9 10s.

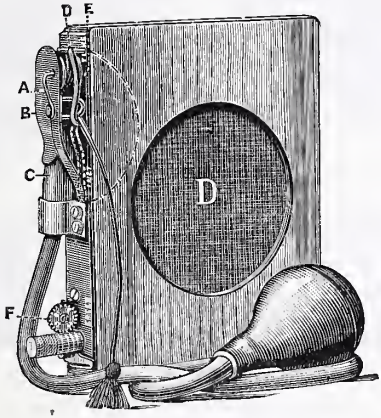


No. 200.

200.—**Mahogany Rebound** (C. C. Vevers).

A cheap shutter, made of mahogany, working upon the rebound principle.

Prices—¼ pl., 1/6; ½ pl., 2/6



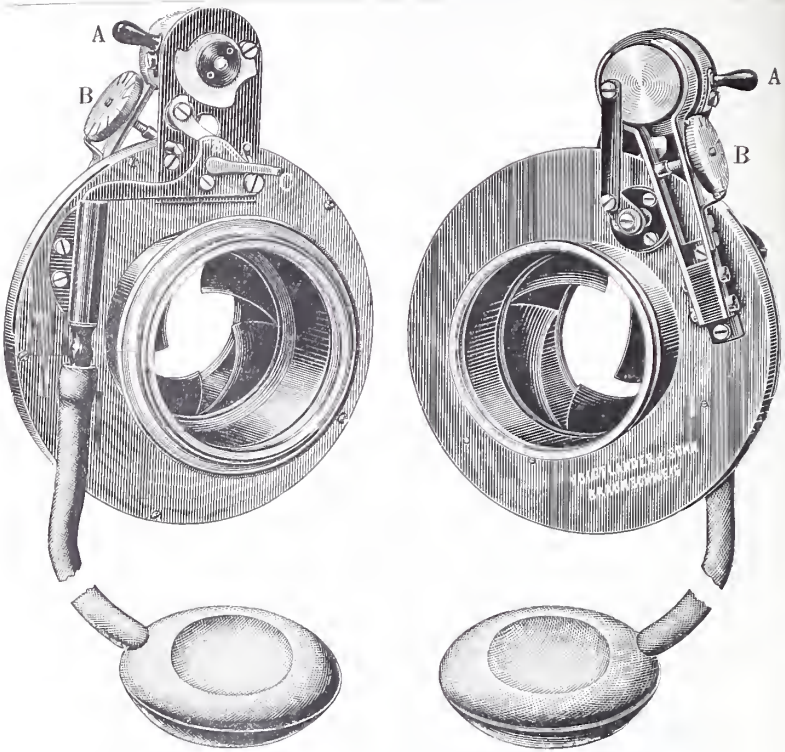
No. 201.

201.—**Kershaw's Time and Instan.** (Marion & Co.)

The shutter by this maker has long been celebrated for instantaneous work. This season, however, an arrangement has been added for time exposures, thus making it still more perfect. This is accomplished as follows:—The wire pin E is turned up, and the little cog-wheel F moved until the broad arrow is opposite the word "speed" on the brass plate. The string is now pulled right out until the blind has the letter U in the centre. This is fixed by the brass wire catch, the end dropping into a hole in the pulley wheel. So long as the bulb is pressed the shutter remains open.

Prices—

For Hood of Lens	1¼in. and under	17/-
,, ,,	1⅝in.	18/-
,, ,,	2in.	19/-
,, ,,	2¼in.	20/-
,, ,,	2½in.	22/-
,, ,,	2¾in.	24/6
,, ,,	3in.	27/-
,, ,,	3½in.	31/-
,, ,,	4in.	37/-
,, ,,	4½in.	41/-
,, ,,	5in.	47/

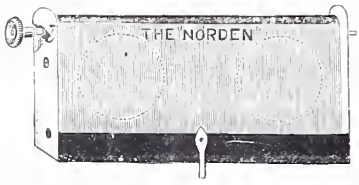


No. 202.

202.—**Voigtlander's "Sector"** (Marion & Co.)

A shutter which works between the combinations of the lens. By means of its eccentric form of opening and closing, considerable advance is made towards the solution of the problem how to get the whole of the rays of light given by the lens equally during the exposure. As an instantaneous shutter it will work up to about $\frac{1}{16}$th second, and there is an arrangement for time exposures as well.

Prices—£5, £5 10s., and £6 5s.

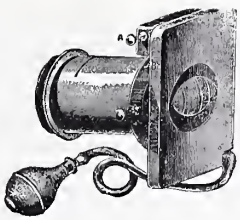


No. 203.

203.—**The "Norden" Stereoscopic** (S. & J. Mitchell).

A shutter for stereoscopic work on the lines of the "Norden Flap" (see Phot. An., 1891, p. 462), with hand and pneumatic release.

Prices—6/6 and 10/6.

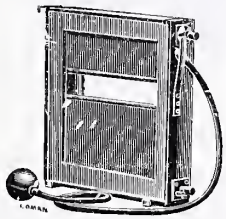


No. 204.

204.—**The "Constant"** (J. R. Gotz).

A new shutter, the invention of a Belgian engineer. As its name implies, it is ever set or "constant," pressure on the ball being all that is required. The one sent, which is large enough for the hood of a lens of 2¼in. outside diameter, is entirely of metal, and yet weighs under 5 oz. It measures only 3⅝ × 2½ inches. It is, therefore, wonderfully neat. The opening sheaths are elliptical in shape, and the movement is therefore from the centre. A little lever is moved about ⅛in. to alter the exposure from "instantaneous" to "time," in which latter state it remains open as long as the pressure on the ball is retained. For longer exposures, a small button at the top is pushed home, after the shutter is opened, and until that is pulled out again the aperture cannot be closed. Altogether it is one of the neatest shutters I have ever seen, being nickel-plated it looks well, and it ought to be a useful one for hand cameras. It will certainly be heard of when fairly on the English market.

Prices from 20/- to 40/- according to size.



No. 205.

205.—**Loman's L.E.** (Loman & Co.)

A shutter upon the blind principle, working next to the plate. The firm fit it to their "Holland" camera. It can, however, be added to any camera, but in this case it is necessary to send the dark slide.

Prices, which include cost of fitting—

¼ pl.	½ pl.	¾ pl.	12 × 10	15 × 12
£2 1 8	£2 10 0	£2 18 4	£4 3 4	£5 8 4

206.—**New Blind Shutter.**

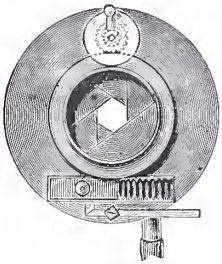
Mr. B. J. Edwards has of late been devoting considerable attention to improvements in the roller blind pattern of shutter. The first model of the result is now before me. It possesses the advantage of a sky-shade, which also serves to keep the aperture of the lens covered whilst setting the shutter. Another feature is that the blind goes up instead of down, which is the correct movement when the shutter is in front of the lens. The third advantage is that, by means of the flap, time exposures may be given without that liability to vibration, caused by the sudden catching of the blind, that is usual in blind shutters arranged for time exposures. Although the one I have been trying is a rough model, it works beautifully; the shutter is no larger in dimension, and I understand the cost will be no greater. Referring to the different movements, they may be classed as follows:—

Instantaneous.—The blind is first wound up, a good size cog-wheel, needing only one complete turn, being used. The flap is raised, and when high enough to clear the lens (but not before) the discharge is effected. The usual alterations of speed can be made.

Time (Moderate).—By winding the cog-wheel half way up the blind uncovers the lens. The flap is then raised slowly, and upon reaching the top releases the blind and ends the exposure. By this means, of course, the foreground gets a prolonged exposure.

Time (Prolonged).—The blind is placed in the same position, but a catch is turned so that raising or lowering the flap does not release the blind at all. The exposure can therefore be prolonged at will, the flap being used as a sky-shade, or to give prolonged exposure to the foreground by gradual raising and lowering.

The shutter can be fired by a pneumatic ball and tube, but in this case the flap must be lifted and placed as a sky-shade before pressing the ball. Altogether, this new shutter is distinctly in advance of any blind pattern at present upon the market.



No. 207.

207.—**Iris "Eclipse"** (Shew & Co.)

This is a shutter giving quite a new power. It combines the use of a diaphragm—that is to say, the shutter and the stop are one. The illustration gives an idea of the shape; but one of its principal features is, doubtless, the small size, and although constructed entirely of metal, it is not heavy. In the larger sizes aluminium is to be used. It works between the combinations, the sheaths being very like the Iris diaphragm. The size of the aperture can be adjusted without uncovering the lens, and when the shutter opens and closes it uncovers just the amount required. The feature, perhaps, of most importance is that it really does uncover the inches set forth below, whereas many other patterns only uncover about two-thirds of what they are supposed to do. This means that taking the size required to be uncovered, this shutter is very much smaller and neater than others. The one I have tried has a circumference of 5¼in., and is only a quarter-inch thick.

Prices—To uncover 1in., £2 10s.; 1½in., £3 10s.; 2in., £3 15s.

PART VI.

MATERIALS.

NEGATIVE PLATES AND FILMS. OPAL AND POSITIVE PLATES AND FILMS. DEVELOPED PAPERS. PRINT-OUT PAPERS.

NEGATIVE PLATES AND FILMS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Plates.			
Ahney	Clarke	Isochromatic	Sun
Advance	Derby	Pall Mall	Tailfer
Apollo	Don	Matchless	Thomas
Appleton	Eclipse	Mawson	Trafalgar
Azaline	Edwards	Miall	Verel
Beernaert	Elliott and Fry	North British	
Brightonian	England	Obernetter	
Brilliant	Favorite	Paget	Films.
Britanni	Fry	Perfection	
Charterhouse	German	Regent	Eastman Stripping
	Ilford	Richmond	Morgan and Kidd's
	Imperial	Soho	Pumphrey's

The following were described in "Photography Annual," 1891:—

Plates.				Films.	
Academy ...	...Marion	London ...	...Wratten	Special Portrait	...Edwards
Barnet	...Elliott	Matchless ...	...Verel	Thickly Coated	...Thomas
Becker's ...	...	Nys	...L. & P. Co.		
Brit. Instan. ...	..Marion	Paget XXX ...	...	Celluloid ...	...England
Castle	...Mawson	,, XXXXX ...		,, ...	...Fry
Cyclist	...Thomas	Perron ...	...Robert	Hinton's ...	...
Ground Glass..	...Fry	Phœnix ...	...Paget	Transparent ...	...Eastman
,, ,,	...Thomas	Photo-Mechanical	...England	Xylonite ...	...Fitch
		,, ,,	...Mawson		
		Special Landscape	...Edwards		

Note.—The prices will be found at the end of the part.

208.—**Ilford Isochromatic Plates** (Britannia Works Co)

Two tests were made, one for speed and the other for colour correctness, without a screen. In the first case a difficult subject was chosen—a lady in a dead black dress, with a baby in long white clothes, taken in a good morning light and in the afternoon respectively. I am bound to confess that the trial against a white label Ilford and a Lumière plate did not show any advantage to the isochromatic emulsion in the bright actinic light of the morning. But in the afternoon, when the sun began to settle down, and the light to become yellower, the ordinary plates were left far behind as regards speed. For colour rendering a fancy dress subject was requisitioned, a "Buccaneer" costume of black and yellow tights and jersey, white skirt with red stripes, blue jacket with white collar and gold buttons, and a red cap. A more severe test could hardly be got together. Upon the ordinary plate the result in the print was simply that the black and yellow tights and jersey were one dark mass, the difference in colour being indistinguishable; the jacket was all white, the skirt white with black stripes, and the cap black. In the isochromatic plate the differences were much better marked. The plates exposed were developed with pyro-potash, hydrokinone, and para-amidophenol developers, with the result that pyro-potash gave a

good printing negative, hydrokinone a rather black and white, and para-amidophenol thin, delicate results. One point must be mentioned, which is that these plates are now issued at a much lower price than heretofore.

Formulæ and Instructions.—These plates are more sensitive than ordinary plates to the usual red or yellow light of the dark room; therefore great care must be taken to use only a *dull light of a deep ruby colour*, and to shield the plate as much as possible during the manipulations. It will be found a good plan to cover the dish until the development is nearly completed. An amount of light which would be perfectly safe with ordinary gelatine plates is quite sufficient, with these colour-sensitive films, to cause fog and spoil the negative.

Development.—Ammonia should not be used under any circumstances for the development of these plates. Any of the other recognised formulæ will be found suitable, but we most strongly recommend the following

STOCK SOLUTION.

Pyro 1oz. Sulphite of soda 6oz. (av.) Water to 24oz.

This will keep for a considerable time.

No. 1.

Stock solution	8 ozs.
Water	12 ,,

No. 2.

Carbonate of soda (not bicarbonate) ..	2 ozs. (av.)
Brom. potass.	20 grs.
Water to make	20 ozs.

These solutions will keep for several days. For use take equal quantities of Nos. 1 and 2. Pour the mixture steadily over the plate, avoiding air-bubbles; rock the dish gently, taking care to keep the plate well covered with the solutions. Do *not* hurry the development, but allow the plate to remain in the solution *after all the details are visible*, until the required density is obtained. With these plates and the above developer there is no danger of fog, except from light or over-exposure. In cases of under-exposure the above mixed solutions may, with advantage, be further diluted with an equal quantity of water. In cases of over-exposure, reduce the quantity of No. 2 solution.

Alum Bath.—After developing, well wash the plate under the tap, then immerse for a few minutes in the following solution:—

Alum	3 ounces (av.)
Water	20 ,,

Wash well, and fix as usual. N.B.—Do *not* add anything to either fixing or alum bath, and never omit latter.

FIXING

Hyposulphite of soda	1 lb. (av.)
Water	40 ounces.

Leave in fixing bath for several minutes after fixation *appears* complete.

NOTE.—Negatives on these plates develop without difficulty to full printing density. If found too intense they may be reduced by any of the published methods.

Notes re Screens.—For ordinary subjects it is quite unnecessary to use a yellow screen. Where it is requisite or desirable to use a screen, as in copying paintings, or taking landscapes, under special conditions, we recommend the Ilford isochromatic screens. These are of the best glass, and are optically worked. They will be ready shortly. No. 1 increases exposure about three times, No. 2 about six times. These screens should be used *behind* the lens. They are made two inches square.

209.—**"Ilford" Red Label** (Britannia Works Co.)

A new plate of extreme rapidity, for the very fastest work. Though for most of my hand-camera work I use the ordinary, or occasionally the second degree of speed (White Label), yet I confess at times that faster plates are desirable. This is met by the above plates. They are slightly more difficult to develop, and certainly take much longer time. But results are got that with slower plates would be out of the question. The trials were made on a moderately bright day, with stops f/11 and f/16, in ordinary streets, the results somewhat surprising me.

Formulæ and Instructions—

No. 1 Stock Solution.

Pyrogallic acid	1 ounce.
Bromide of ammonium	600 grains.

Made up to 6 ounces with water. When dissolved, add exactly 20 drops of pure nitric acid. This will keep a considerable time.

No. 2.

Strongest liquor ammonia ·880 ..	3 drams.
Water	1 pint.

This will keep for some time if well stoppered.

No. 3.

No. 1	1 ounce.
Water	19 „

This will keep for a few hours only. For developing, mix the solutions Nos. 2 and 3 in equal proportions just before use. If the plate is found to be over-exposed, at once remove it from the dish, and pour over it, once or twice, some of solution No. 3, allowing that which runs off the plate to mix with the solution in the dish. Upon returning the plate to the dish, it will be found in most cases to develop as if correctly exposed. When the development is about three parts completed (or sooner, in the case of under-exposure), it may be hastened by adding more of solution No. 2 Never omit the alum bath before fixing. Acid added to the alum bath entirely destroys its property of hardening the film. Do not be tempted to add alum or any other foreign matter to the fixing bath.

Hydroquinone.—Solution No. 1.

Hydroquinone	160 grains.
Bromide potassium ..	30 „
Sulphite soda	2 ounces avoirdupois.
Water	to 20 ounces.

Solution No. 2.

Soda hydrate	100 grains.
Water	20 ounces.

For use, take equal portions of each. The manipulation will be the same as for pyro development.

210.—**The "Imperial"** (Imperial Dry Plate Co.)

The new works at Cricklewood are now quite ready for work. I have tried the plates sent, viz., ordinary and extreme rapidity. The latter were tried, of course, in the hand camera. The film appears of good thickness with plenty of silver; the results were plucky and vigorous, and the development and fixing took about the usual time. The plates are issued in three degrees of rapidity, and are described as follows: Ordinary, extra rapid, extreme rapidity. The plates appear to possess good all-round qualities, and, if regularly kept up to the standard, should make their mark.

Formulæ—

STOCK SOLUTION.

Pyrogallic acid	.. .. ..	1 oz. av.
Ammon. bromide	.. .. ..	1 oz. ,,
Water, to make	.. .. ..	10 ozs. fluid.
Nitric acid (strong)	.. .. ..	25 drops.

No. 1.

Liq. ammon.	.. .. ..	·890 $2\frac{1}{2}$ drachms.
Water	.. ..	20 ozs.

No. 2.

Stock solution	.. .. ..	$1\frac{1}{2}$ ozs.
Water	.. ..	$18\frac{1}{2}$,,

211.—**The "Black Band"** (LONDON STEREO CO.)

A new series, prepared from a special formula in two rapidities, 19 and 25, Warnerke. The rapid plate is specially suitable for indoor portraiture, giving soft, harmonious negatives; the slower is more suitable for landscapes and outdoor work, giving a brilliant image with plenty of density.

212.—**The "Nys"** (LONDON & PARIS OPTIC CO.)

As it appears that efforts have been made to increase the speed of these plates, which were dealt with on page 476, PHOT. AN., 1891, I thought it well to test them in that direction. There is no doubt that up to the present no faster plate is made, and whilst trusting that I am sufficiently patriotic, truth, after trial, compels me to state that only three or four of our English makes are equal to them as regards speed. Either the developing formula is not enclosed in each box, or I mislaid it, but failing this plain hydrokinone and pyro soda developers gave very good results.

213.—**The "Studio"** (ELLIOTT & SON).

Recognising the fact that a really quick plate at a popular price is needed and sought after by photographers, the firm have now increased the speed without raising the price. They recommend this plate for indoor work especially. Of course, much depends upon the ideas of the worker, but for one who prefers a soft, velvety image full of detail, this is the plate.

214.—**Carbutt's Celluloid Films** (LONDON STEREO CO.)

These have of late been much reduced in price. They were almost the earliest sold in this country. They are now made in three rapidities, and also orthochromatic. They require no difference in development from the ordinary glass plate, except that preferably ammonia should not be used as the alkali. The mixed eikonogen and hydrokinone developer gives perhaps the finest results.

215.—**Isochromatic Films** (B. J. EDWARDS & CO.)

In introducing a film coated with the same emulsion as their now well known isochromatic plates, the firm have made a decidedly popular step to the front. The packet given me was one out of stock, quarter-plate size (yellow label)—that is, the most rapid series issued—for trial in the hand-camera. I purposely waited for a dull day, in the magazine mixed up Lumière plates with the films, and started off into town to get amongst the streets. The object was to test for speed, and therefore the least possible exposure was tried for. The lens was worked at f/11 and f/8, the shutter at the $\frac{1}{50}$th; and these factors upon a dull day in January, in the somewhat narrow streets of the town, were, I thought, a pretty stiff test. The conditions for some of the exposures were so extremely against the films that to develop an image at all would hardly have been dreamt possible. However, the results either proved the speed of the emulsion or

the mistake of trusting to the eye to estimate the strength of actinic light. Rodinal and the firm's snap-shot developer were used in development for all but two plates, and in each case, though of course the images are thin, yet they are all printable, and, if intensified, would give good negatives. The results upon the films were slightly better than upon the plates in the morning, but in the afternoon the gain increased considerably. I have no hesitation in saying that as far as I have tried the films up to the present they certainly are extremely rapid. The material of the film is not quite so thick as some, but is sufficiently rigid to be as easy to manipulate as a plate.

Development.—Any good formula for developer may be used. For pyro development the following is recommended:—

Stock Solutions.—No. 1.

Pyrogallic acid	1 oz.
Citric acid	40 grs.
Water	7½ ozs.

No. 2.

Bromide of potassium	120 grs.
Distilled water	7 ozs.
Strong ammonia, ·880	1 oz.

The above will keep good, if well corked, for months.

To make the developer, add one part of No. 1 to fifteen parts of water, and in another bottle mix one part of No. 2 with fifteen parts water. The dilute solutions should be made fresh every day.

When required to develop a plate, mix equal parts of these two solutions just before use; place the exposed plate face up in a shallow dish or tray, and pour the mixture steadily over the plate, avoiding air-bubbles; rock the dish gently, taking care to keep the plate well covered with the solutions. Do *not* hurry the development, but allow the plate to remain in the solution *after all the details are visible*, until the required density is obtained. With these plates and the above developer there is no danger of fog, except from light or over-exposure.

Fixing.

Hyposulphite of soda	4 ozs.
Water	16 ,,

Clearing Solution.—After fixing, rinse under the tap, then flood the plate with, or immerse for one minute in, the following solution:—

Alum	1 oz.
Sulphuric acid	¼ ,,
Sulphate of iron	3 ozs.
Water	20 ,,

Wash well, and dry as usual.

216.—**Edwards's Landscape Films** (B. J. Edwards & Co.)

These are coated with the same emulsion as their famed landscape plates. In other respects they are the same as the isochromatic films, and the firm issue them at the same price.

217.—**Adams's Celluloid Films** (Adams & Co.)

These are rather thicker in substance than some of the other makes, and are consequently easier to handle. There is no difference, however, as regards exposure or development, but the after operations are easier, as the films are thick enough to place in racks to wash, or to stand upright to dry.

218.—**Fry's Celluloid Films** (Fry Manufacturing Co.)

Keeping pace with the requirements of the market, these well-known films have been considerably reduced in price. There is, however, no difference in quality.

219.—**The Professional Backing Papers** (Percy Lund & Co.)

The cure of halation, that most troublesome and annoying feature of the gelatino-bromide dry plate, consists in backing the plate in some way. Applications of paste, lampblack, &c., are to some extent messy in use, and care has to be taken that the solution used is sufficiently tenacious not to shake off the back as dust, upon the front of the plate, with its consequent crop of pinholes or spots One of the simplest methods is to squeegee in optical contact an opaque paper. The papers above mentioned are prepared expressly for use in this way, being of deep orange colour, ready gummed on one side. All that is necessary is to damp the paper—which I found easier to do in damp blotting paper, as a sponge made the paper too soft for easy handling—place upon the plate at the back, and run over a roller or other squeegee. To remove it before development is the easiest possible thing, a damp sponge accomplishing the matter in a very few seconds. I found that the paper, if evenly damped, came off as a whole, and thus avoided any running on to the surface of the film, a trouble I have met when using pastes.

220.—**Cardboard Protectors** (Geo. Wheeler & Co.)

These are neat little frames of cardboard for inserting between plates either before or after exposure. They prevent contact of the glass, and therefore prevent any grinding action, and as they are merely narrow frames the surface is only touched at the very edge. They should prove a boon in packing plates, and they cost very little.

221.—**Anti-halation Paper** (Geo. Wheeler & Co.)

Ready gummed and cut paper of a deep ruby tint, sold in packets of 50, all ready for use. These should prove of great convenience.

OPALS, AND POSITIVE PLATES AND FILMS.

The following were noticed in the "Photographer's Indispensable Handbook:"—

Transparency Plates.	England.	Fry ... ...Fry
Marion's Ground Glass.	Fry.	Hunt ... ...Hunt
„ Chloro-bromide.	Mawson.	Marion... ... ...Marion
	Newton.	Argentic ... ...Morgan
Ferrotype.	Pall Mall.	Stereoscopic Co. ...
Phœnix Dry Plate.	Pearl.	Matt Surface... ...Thomas
	Pumphrey.	Transparent ... ... „
Lantern Plates.	Verel.	Verel ... ...Verel
Clarke.	Opals.	Bevel Edge ... ...Fry
Cowen.		„ „ ... ...Marion
Edwards.	Britannia ... ...Ilford	Pearl Print-out ...Gilliard
	Clarke ... ...Clarke	Portrait Chloride ...Marion

The following were described in "Photography Annual," 1891:—

Plates and Opals.	Lantern Plates.	Films.
Advance ... ...Brit. Works	Alpha ... ...Brit. Works	Embossed ... ...Fitch
Alpha ... ...Prestwich	Beckers	Ivory ... ...Fry
London ... ...Wratten	Chloride (Rapid)...England	Matt Surface ... ...Fitch
	Chloride (Slow) ..England	Plaques... ... ...Fry
	Ilford Special ...Brit. Works	Xylonite.. ... ...Fitch
	Thomas's	

Note.—The prices will be found at the end of the part.

222.—"Criterion" Bromide Opals (Birmingham Photo Co.)

This firm is extending its operations considerably, although identified with the "Kallitype" process. A series of opals are now issued, and having tried the above, I find them to give very good results with either hydrokinone or ferrous oxalate, the latter, perhaps, for preference.

Instructions.—It is almost impossible to give any reliable guide as to exposure, as the conditions are so exceedingly variable, but it may give some slight indication of the time required if we say that the exposure from the negative of medium density, in which the head is 1in. and enlarged to 3in., using a ¼-plate portrait lens with 1in. stop, would be about 15 or 20 seconds in an average good light. A trial strip of paper is enclosed with each box of plates, and a small piece torn off and used as a test will prevent any waste of plates. For development make the following solutions:—

A.

Neutral oxalate of potash	1 lb.
Citric acid	1 dram
Hot water	50 ozs.

B.

Sulphate of iron	15 ozs.
Citric acid	1 dram
Hot water	30 ozs.

To develop a properly exposed picture take in the proportion of 3 ozs. of A to ½ oz. B, and three or four drops of a solution of bromide of potassium of the strength of 20 grains to the ounce. In mixing add B to A, *not* A to B. If the oxalate is added to the iron solution the iron will be precipitated. Use fresh. If a plate is over-exposed the image will come up quickly, the whites will be muddy, and the blacks lacking in richness. If not very much over-exposed a plate may often be saved by quickly washing off the developer and beginning again with fresh developer, to which six or more drops of the solution of bromide of potassium has been added; this will delay development, and keep the whites pure while the blacks are gaining in strength. If only slightly over-exposed, pour the developer back into the developing cup and add a drop or two of the bromide of potassium solution. If much bromide is added the colour of the picture is not so good. The best colour can only be obtained by correct exposure, and using the minimum quantity of bromide. An under-exposed plate develops very slowly with chalky whites and inky blacks. In a correctly timed print the image begins to appear in about 30 seconds, and development is complete in about three minutes. The character of the picture may be considerably modified by the method of development. When enlarging from a dense negative give a full exposure, use a very small quantity of iron (the B solution), and little or no bromide. With a thin negative give a short exposure, use as much iron as the oxalate will take without becoming precipitated (about one pint in three), and add a little more of the bromide solution. When the picture is sufficiently developed pour over it a solution made as follows:—

Acetic acid	3 drams
Water	2 quarts

Rub carefully with cotton wool. Place in a dish of this solution for a few minutes, and after thoroughly rinsing under the tap, fix for a quarter of an hour in—

Hyposulphite of soda	6 ozs.
Water	1 quart

All the operations up to this point must be conducted in the dark room. After fixing wash for an hour or two in running water. If through

insufficient treatment with the acid bath after development there should remain the slightest trace of yellowness, this may be removed by immersing in a clearing bath composed of—

Sulphuric acid	1 oz.
Water	80 ozs.

The picture must be very thoroughly washed from the hyposulphite before immersing in this bath. Another washing for about three-quarters of an hour in running water and the picture is ready for drying.

223.—**"Criterion" Print-out Opals** (Birmingham Photo Co.)

These are coated with a gelatino-chloride emulsion, and the toning and fixing is just the same as for any printing-out paper. Not being able to lay hands upon a proper printing frame, I resorted to the old dodge of binding one side of the negative and plate together with a strip of slide binding and placing in an ordinary printing frame, which answered just as well. This dodge is mentioned, so that would-be purchasers need not be frightened at the idea of having to buy special printing frames. The opals toned splendidly and quickly in the combined bath, and the results were excellent.

224.—**Fry's Opals** (Fry Manufacturing Co.)

In March last Mr. Herbert Cecil wrote a rather strongly-worded letter to *Photography* complaining of the exorbitant prices charged for opals. This was backed up by Mr. F. H. Rigoletti. The Fry Manufacturing Co. took up the matter, and after agreeing that the high price was due to the small demand, resolved to try what could be done by a reduction of prices, which they made forthwith. It will therefore rest to a considerable extent with the users of opals as to the price remaining, as the demand must to a large extent govern matters. The firm have made a bold step in making the reduction, and I trust will meet with their reward.

225.—**Carbutt's Positive Films** (London Stereo Co.)

These are of an ivory-like texture, and produce splendid results. The manipulation being the same as for bromide paper, they are amenable to uranium toning, giving the effect of a red carbon on ivory at the cost of a few pence.

226.—**"Criterion" Bromide Cards** (Birmingham Photo Co.)

These are just one of the many things that strike the observer as something that ought to have come long ago. They are good quality cards coated with a bromide emulsion, and are worked in precisely the same way as paper. After washing and drying, the effect is that of a mounted print. They are extremely convenient.

Instructions.—See "Criterion" opals, No. 222.

227.—**The Esmail Enamel** (A. Guye, jun.)

The production of burnt-in enamels from photographic plates has for many years attracted the attention of a few. But owing to the great difficulty of the operations, the uncertainty as to result, and the expense, but very few photographers have turned their attention to it. With the Esmail process, however, so far as I can judge, it is open to anyone. The operations of sensitising the plate, exposure and development, transferring the film to the prepared enamel tablet, are easy enough, and require nothing more than ordinary care. The only difficulty is the use of the muffle furnace, but that can be got over by sending the tablet to Mr. Guye, who undertakes this last part of the work, termed "fixing," at a very reasonable price, viz., 6d. for small sizes. The process is applicable also, of course, to glass transparencies, decoration of china, &c.

Instructions.—In this process, a glass plate is first coated with a sensitive solution, and then exposed in an ordinary photographic frame under a *positive* transparency. The picture is developed by brushing the plate over with Esmail developing powder by means of a soft camel-hair brush. After flowing collodion over the picture and placing it in a weak solution of sulphuric acid, the film will detach itself from the glass, and can then be transferred to the Esmail enamel. The picture is fixed by heating the enamel to redness in a small muffle furnace, but those who wish to avoid this expense can send the enamel to the proprietor for fixing. The coating and drying of the plate can be conducted in an ordinary room if the shutters are closed, but all the other manipulations can be performed in broad daylight.

Coating the Glass Plate.—The glass plate on which the sensitive film is first produced should be much larger than the enamel on which the picture will be ultimately fixed, and it must be thoroughly cleaned. This may be done by placing it for a short time in a weak solution of sulphuric acid (1 part of acid to 20 of water), or by rubbing it with tripoli solution; in either case, when drying the glass with a soft rag, it should be rubbed with a circular motion, similar to that adopted in French polishing. The final polish may be given with a chamois leather, though this is scarcely necessary. This rubbing will electrify the glass, and cause it to attract light particles of dust. It should therefore be laid aside for a short time and be brushed *very gently* with a flat camel-hair brush *immediately* before pouring on the sensitive solution.

The sensitive solution may be prepared from any good formula for the "powder process" but the following is strongly recommended:—

First, prepare the gum solution thus:—

A.

Esmail gum mixture	..	½oz. or 10 grammes.
Best moist sugar ..	..	½oz. 10 ,,
Boiling water ..	..	10oz. 200 c.c.

When the gum mixture has completely dissolved, the solution should be filtered at least twice by passing it through a glass funnel plugged with cotton-wool, which will be found more convenient than filter paper. This solution may be kept until fermentation commences. Secondly, prepare the following:—

B.

Pure dichromate of ammonium,		1oz. or 30 grammes.
Water ..	.. ..	10oz. 300 c.c.

When all the dichromate has dissolved, filter the solution once. This will keep a very long time. The sensitive solution is composed of—

S.

Solution B. ..	.. .. ..	1oz. or 25 c.c.
Solution A. ..	.. .. ..	4oz. 100 c c.

When once mixed, the sensitive solution should not be kept for more than three or four days, for it soon loses its sensitiveness. When the weather is exceptionally dry, add from 1½ dr. to 3 dr. (5 c.c. to 10 c.c.) more of B, and when very damp use from ½ fl. dr. to 3 dr. (2 c c. to 5 c.c.) less. When not in use, the solution S should be kept in a dark place.

The plate being freed from all dust as directed above, the solution S is poured on in the same way as collodion or negative varnish; that is to say, the plate is held by a corner in the left hand, while the sensitive solution is poured on and allowed to form a large pool near the top edge. By rocking the plate slowly, the liquid may be made to flow evenly over the glass, and as soon as it is covered with a uniform film, the surplus should be allowed

to drain off into a glass funnel plugged with cotton wool and placed in the mouth of a spare bottle. In draining the solution, an excess will collect along the bottom edge; this should be wiped off with a rag kept for the purpose. The surplus solution collected and filtered as just described may be used for other plates. In damp weather the plate should be gently warmed before applying the solution, to prevent the dichromate crystallising. The plate is now dried slowly over the flame (the smaller the better) of a Bunsen burner or spirit-lamp, the film being, of course, kept upwards, and the plate moved the whole time to prevent it cracking. The plate should only be moderately warmed, and when quite dry—its state may be ascertained by carefully touching all the corners with the fingers—the film should be of a pale yellow; if any parts have become slightly brown by being over heated, or if the film is not free from specks of dust or other blemishes where the picture will appear, the plate should not be used. When once the plate is dry, it should not be kept more than four or five minutes before being placed in the printing frame; in damp weather it is important that it should be still warm when first exposed, but when the atmosphere is very dry, it should be allowed to cool before being placed in the frame. In frosty weather the frame must be exposed near the windows in a warm room.

Exposure.—The sensitive plate is exposed in an ordinary photographic printing frame behind a positive (not a negative) transparency in the usual way, direct sunlight being avoided. Using a good positive on a fine day, less than ten minutes' exposure will generally suffice, though on a dull day or in the middle of winter perhaps as much as thirty minutes will be required with some positives. The plate cannot be examined while it is printing, but this offers no serious difficulty, for with a little experience it is easy to guess the correct exposure from the character of the positive and the quality of the light; just as easy as in the case of a dry plate exposed in a camera. If a sheet of white paper be placed at the back of the frame, it will be seen, through the clear parts of the positive, that the prepared plate becomes darker before it is fully exposed. Over-exposure is easier to correct than under-exposure. The positive transparency may be made from a gelatine dry plate in the usual way; it should be "thin," and the shadows full of detail. Good results must not be expected from a dense positive. The clear parts should also be free from stains, so it is not recommended to develop it with pyrogallol. The positive should be slightly warmed before putting the prepared plate in contact with it, in order to prevent the two sticking together; this, however, is not necessary if a wet-plate positive be used.

Development.—On removing the plate from the frame, an exceedingly faint image will be noticeable, the parts corresponding to the clear portions of the positive having changed to a reddish brown colour. It will also be observed that the brown parts are dry and the yellow moist, the amount of moisture at each place corresponding to the intensity of the shadows of the transparency. In developing the picture the "Esmail" powder will adhere in quantities varying with the amount of moisture existing in different places. If carefully done - and the manipulation requires but little skill—it is really surprising what charming pictures may be obtained; the result is generally more satisfactory than a paper picture, the finest details and every grade of half-tone being often as well rendered as in a wet-plate positive. A small quantity of the "Esmail" developing powder should be slightly warmed in a saucer just before use, and a soft camel-hair paint brush charged with this powder is gently passed over the plate directly it is taken out of the frame, the brush being made to describe small circles, and care taken to treat all parts alike, never passing more over one place than another. Having gone all over the plate once, it is laid aside for 10 or 12 seconds; the brush is again passed over the plate as before, after which it is laid aside once more, and so on, until the picture



From a Negative by F. Lupson, Coventry.

"PHOTOGRAPHY."

is fully developed. By holding the plate over a sheet of white paper it is easy to watch the progress of the development, which should be stopped when the picture appears correct in all its details, as the intensity will scarcely be reduced in fixing. When properly developed, the high lights should be free from "Esmail" developing powder, and the shadows should be full of detail. If slightly under-exposed, the picture will be flat, and if very much so the brush will have a tendency to stick to the film and thereby smudge the picture badly. If over-exposed the picture will develop but slowly, and it will be wanting in half-tone; if very much over-exposed, the deepest shadows only will appear, as the higher lights will be too dry for any powder to adhere. The picture will appear much sooner in damp weather than in warm, and when the atmosphere is very dry, the development may be accelerated by placing the plate on a damp piece of blotting paper each time it is laid aside. The same result may be obtained by simply breathing over the plate, but this should not be attempted by the beginner, as it requires considerable experience. When the picture appears too suddenly in very damp weather, it may be checked by warming the plate very slightly, but this also requires some practice. Incorrectly exposed pictures can be generally saved by accelerating or retarding the appearance of the picture in one of these ways. The powder should always be kept dry, and no dirt of any kind allowed to get into it. Fine dust mixed with it will cause white spots, which only become visible after the picture is fixed. The development can be conducted in broad daylight.

Transferring the Film.—As soon as the picture is developed and all surplus powder shaken off, the plate must be immediately coated with plain (not iodised) negative collodion, which is applied in the same way as the sensitive solution, the excess being allowed to return into the bottle from which it was poured out. This should be done slowly, but it will require more care than the coating of the plate, because the spirits in the collodion soon evaporate. As soon as the plate is covered it must be rocked to prevent the collodion setting in ridges. [It may be useful to remind the reader that collodion is exceedingly inflammable, and should only be used in the day time, far away from a fire or flame of any kind. It should be kept in the dark when not in use.]

As soon as the collodion has set, that is, when it will retain the impress of the finger, the plate is placed in a weak solution of sulphuric acid, namely, 1 part of acid to 10 of water, the latter being added slowly. In a few minutes it will begin to detach itself from the glass, and at the same time its yellow colour will gradually disappear. If it show any tendency to stick near the bottom corner, it should be pushed away from the edge of the plate with the finger nail, if this can be done without touching the picture. The film should be allowed to remain in the acid five minutes after all trace of yellowness has disappeared, and when separated from the glass it may be moved about in the liquid without danger, but it should not be handled out of it. The film may be lifted out of the acid by getting the glass under it again, and pressing it with the finger against that corner of the plate which is raised out of the liquid first. It should then be washed under the tap for a minute or two, the top corner still being held against the glass to prevent the film slipping off. The glass is then turned over, in order to get a right-handed picture, for up to this point it has been reversed. The plate, with the picture downwards, can then be lowered into a dish of clean water, and by sliding it out of the liquid in an oblique position, the film will slip off. The film may be allowed to remain in the water until it is convenient to attach it to the Esmail enamel, and if allowed to remain until air-bubbles collect underneath, it must be washed again on a glass plate before being applied to the enamel. The enamel must be washed in order to free it from dust or dirt of any kind; it is then placed on the horizontal arm of a flat strip of thin metal which has been bent to form a right angle. With this simple instrument the enamel may be lowered

into the water and brought up again underneath the film. While the latter is just under the surface of the water, it may be pulled about over the enamel to get the picture in the centre. When it is in its correct position, the film should be lifted out of the water by the enamel, so to speak. When out of the water, the enamel can be taken off the L-shaped piece of metal by holding it by the edges only, care being taken not to press the fingers against any portion of the film which is resting on the enamel, for the least touch will tear it. The enamel is now placed on a piece of cardboard, and three or four pieces of dry tissue paper laid on top of it. With a tuft of cotton-wool a gentle pressure is applied vertically all over the enamel, to cause the film to lay closely to its surface everywhere. If the cardboard has been previously bent, the enamel can be taken off it without injuring the film, by re-bending it. While the enamel is again being held by the edges, that portion of the film which hangs round the enamel can be got rid of by scraping underneath the edges of the enamel with a sharp knife. This operation generally causes a few creases near the edge, but these are easily removed by laying some more dry tissue paper over the film and pressing it with the cotton-wool as before. Should any air-bubbles be imprisoned underneath the film, they must be pricked with a fine needle before pressing the film a second time. A crease will cause a white line, and an air-bubble a white spot in the fixing. The enamel is now laid aside in a place free from dust, to allow the film to dry; the picture will gradually assume a very disagreeable appearance, but it will regain its beauty in the fixing. The enamel may be kept in this state any length of time before being fixed, but it must be remembered that the least touch will spoil the picture.

Fixing.—The picture is fixed in a small coke or gas muffle-furnace, but *those who wish to avoid this expense can send the enamel to the vendor for fixing.* (See instructions below.) As a make-shift, a muffle placed in an open fire-grate and resting on two bricks to keep it level will answer the purpose, *if* it can be got red-hot everywhere by covering it with coke. It is assumed, however, that the amateur is provided with a small enameller's furnace. When the muffle has been heated to a bright red, two flat discs, made of some refractory substance, are placed inside it. These discs must be rather large, so that they can be handled easily with a pair of tongs without fear of spoiling the enamel during the operations that follow. The enamel is laid on a third disc, which is placed outside the furnace in front of the red-hot muffle, and turned round from time to time to ensure each part receiving the same amount of heat. When the picture becomes quite brown, as if it were spoilt, one of the hot discs is taken out of the furnace and allowed to cool until it has lost its redness; the enamel is then slipped off the colder disc on to the warmer one, which will cause the picture to become intensely black. When no further action is visible, the second red-hot disc is taken out of the muffle, and the enamel is then slipped on to it while it is still red; the picture will now become blacker still, and when it appears to be entirely reduced to charcoal the enamel is placed inside the furnace *very gradually*. The object of passing the enamel from one disc to another is to destroy the collodion by degrees: if it were suddenly placed inside the muffle, the commotion set up in the collodion film would spoil the picture. If the enamel be large compared to the size of the muffle, the disc should be turned occasionally, as the temperature is not the same everywhere; in all cases it should be watched the whole time, and be taken out now and then to examine its progress, but it must be quickly replaced. After it has been in the muffle a few minutes, it will become red, and certain parts will appear glossy, while the shadows, when examined outside the furnace, are still dull. It is only when it will have assumed a very bright red, and all parts are glossy, that it should be removed from the furnace. The disc holding the enamel is now placed on top of the furnace for a few minutes, and afterwards laid on some colder substance, in order to allow it to cool gradually.

After losing its redness, the enamel will attain a very unpleasant yellow colour, but as it gets cold it will regain its whiteness, and then the picture will assume a beauty possessed by no paper print. If it stick to the disc, the latter should be tapped very briskly, which will cause the enamel to jump off. If left too long in the furnace, the picture will become flat, a fault which cannot be corrected except by retouching it. If not sufficiently glossed, it should be replaced in the muffle and undergo the same treatment as before, so it is better to take the enamel out too soon, rather than leave it in the muffle too long. One of the extraordinary properties of the Esmail enamels is that they can be treated in this way any number of times without fear of being spoilt.

Retouching.—This is unnecessary, unless the positive transparency is disfigured with black or clear spots. Black spots may be erased or reduced in intensity by being pricked as often as is necessary with a fine needle, fixed in a penholder, before the picture is fixed, but after the collodion has been partially destroyed; that is to say, after the enamel has been placed in front of the muffle, but before it has been placed on the first hot disc. White patches are filled in after fixing. Mix sufficient of the Esmail developing powder with oil of spike lavender to form a thin paste; then apply this with a fine paint-brush, or a peg of hard wood sharpened like a pencil, over the white place, repeating the operation until the proper shade has been attained. This is fixed in the same way as the original picture by replacing the enamel in the furnace. Retouching should only be resorted to in exceptional cases.

DEVELOPED PAPERS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Britannia	Britannia Works Co.	Alpha	Britannia Works Co.
Eastman	Eastman Co.	Chloride	Marion.
Hunt	Hunt & Co.	Argentotype	Fry.
Marion	Marion.	Positive	Morgan & Kidd.
Argentic	Morgan & Kidd.	Platinotype	Platinotype Co.

The following were described in "Photography Annual, 1891":—

Argentotype	Fry.	Kallitype	Birm. P. Co.
Cold Bath Plat.	Platinotype.	Mawson's Bromide ...	
Just's Bromide	Lund.	Naturalistic	Fry.

Note.—The prices will be found at the end of the part.

228.—**The "Ilford" Bromide** (Britannia Works Co.)

This is included because the prices have been lowered. Two rapidities are still issued, rapid for enlargements and slow for contact printing. These are not arbitrary divisions, as neither brand is *too* slow or *too* fast. But they serve to give a range, sufficient for practical exposures. This paper works capitally with hydrokinone.

229.—**The Eastman "Extra Rapid"** (Eastman Co.)

A new paper has been introduced under the above title, the older kind being now termed the "Permanent," as a distinctive designation. The feature of the new paper is that it is faster in speed, and gives softer results. It is therefore suitable for dense negatives, which often give harsh black and white results on ordinary bromide paper. It is issued in three grades, the same as the older make.

"A"—Smooth surface, thin, for proofs, positive printing, copying drawings, &c., by contact.

"B"—Smooth surface, heavy, for positive printing, enlarging and working in ink, oil and water colours.

"C"—Rough surface, heavy, for positive printing, enlarging and working in crayon, ink, water colours and oil.

Instructions—

No. 1.

Oxalate of potash (neutral)	1 lb.
Hot water	48 ozs.

No. 2.

Proto-sulphate of iron	1 lb.
Citric acid	½ oz.
Hot water	32 ,,

No. 3.

Bromide potassium	1 dram
Water	10 ozs.

These solutions keep separately, but must be mixed only for immediate use.

To Develop.—For normal exposures take in a suitable tray—No. 1, 6 ounces; No. 2, 1 ounce; No 3, ½ dram (about 5 drops to the ounce of developer). These solutions should be employed as cool as possible, and mixed in the order named. After exposure, soak the paper in water until limp; then immerse in the developer. Use fresh developer for each batch of prints. With a glass-bottomed tray, eight ounces of developer are sufficient for a 25 × 30 print. The bromide is added to the developer for the purpose of producing vigorous contrasts of light and shade, and of preserving the clear whites of the prints. When printing from a negative which is thin, or flat, the proportion may be safely increased to twice that named above.

No Toning Required.—With Eastman's permanent or extra rapid bromide paper the final tones may be varied to almost any extent, depending as they do upon the density of the negative, the quality of the light used in printing, and the proportion of iron and bromide employed in the developer. For delicate, grey tones, like the India-ink washes of an artist's brush, it is requisite to expose to a well-diffused light, and to develop with a smaller quantity of iron and bromide in the developer. For vigorous prints, with full contrasts, the image should appear slowly, and should develop up strong, clear and brilliant. When the shadows are sufficiently black, pour off the developer and flood the print with the

Clearing Solution.

Acetic acid	1 dram.
Water	32 ozs.

Instead of acetic, citric acid may be used in the clearing solution, in the proportion of ⅛ ounce to the quart of water. Citric acid has the advantage of being odourless.

Purpose of Clearing Solution.—The purpose of the clearing solution is to prevent the precipitation of the iron from the developer into the fibre of the paper. This can only be done by keeping the paper acid while washing out the developer. Do not wash the print after pouring off the developer and before applying the clearing solution. Use a sufficient quantity to flow over the print, say 2 ounces for an 8 × 10. Allow it to act for one minute, and then pour it off and apply a fresh portion; repeat the operation a third time, then rinse in four changes of pure water, and immerse for ten minutes in the

Fixing Bath.

Hyposulphite of soda	4 ozs.
Water	20 ,,

After fixing, wash thoroughly in several changes of water for two hours at least, and hang up to dry.

Clean Dishes.—Clean Hands.—The faintest trace of hyposulphite of soda or of pyrogallic acid is fatal to good results with bromide paper, and the operator cannot be too careful to avoid any contamination. The tray used for developing with oxalate should never be used for anything else.

230.—**"Kallitype" No. 2** (Birmingham Photo Co.)

This process is slowly but surely making its way into public favour, and the latest introduction, "Kallitype" No. 2, is aiding the fact considerably. In the first place, it does away altogether with the use of nitrate of silver with its finger-staining propensities, a feature that at once commends it to amateurs. Moreover, it is now more certain in its working, and the results are better. It very closely resembles a good platinotype print. Two kinds of paper are sold, viz., matt surface and albumen. The process has certainly a future before it.

Instructions—

Printing.—"Kallitype" is not a *printing-out* process; the image before development is only a faint one. Care must be taken that the paper is quite dry when put out to print, or it will not be so easy to determine the proper exposure, and the resulting print will not be so good a colour.

Exposure.—Five to ten minutes in a good light, or from two to three minutes in sunlight, is an average exposure. When the detail in the densest parts of the negative is faintly indicated, the printing must be stopped.

Development.—The prints are *immersed*, one at a time, in a solution of—

No. 1.—For Black Tones.

Rochelle salt	1 oz.
Borax	¾ ,,
Water	10 ,,

12 to 15 minims of solution bichromate of potash (20 grs. to oz.)

No. 2.—For Purple Tones.

Rochelle salt	2 oz.
Borax	¼ ,,
Water	10 ,,

10 to 12 minims of solution bichromate of potash (20 grs. to oz.)

Be careful to remove any air bubbles that may be formed on immersing the prints in developer; a touch with the finger will easily do this. A considerable number of prints may be developed at the same time, and development will be complete in about thirty minutes. If greater contrast is desired, the addition of one drop of a 20-grain solution of bichromate of potash may be made to each 10 ounces of developer, and more if necessary. Too much bichromate will destroy the half tone. Development must be conducted in a subdued light, and if the developing solution is kept carefully from the light, it will serve to develop a great number of prints. Five or six dozen ½-plate prints may be developed with 10 ounces of solution, then it will be well to throw developer away and make fresh. The developing solution serves the double purpose of developing the image and also that of rendering the iron soluble in the ammonia fixing bath, so if it is used too long the prints will be liable to show yellow stains when finished. The developer is very cheap, and it is recommended to use plenty of it, and to keep the prints moving about freely during the whole time they are in the solution. If the prints are removed from the developer too soon, the yellow colour will not entirely disappear in the ammonia baths.

Fixing.—The prints are next fixed by immersing for ten minutes in fixing bath—

Strong ammonia	4 drams
Water	1 quart

Note.—With albumen prints, use only 8 to 10 drops of bichromate potash solution in 10 oz. developer, and fix in ammonia bath half the strength of that used for the matt paper.

To ensure perfect fixation, it will be best to pass them through a second ammonia fixing bath, made in the same way as above—allowing them to remain ten minutes, moving frequently. After washing in several changes of running water for about a quarter-of-an-hour, the prints may be blotted off between clean cloths or blotting-paper and dried in the air.

PRINT-OUT PAPERS.

The ollowing were noticed in the "Photographers' Indispensable Handbook:"—

Sensitised Albumenised.	Iris	Sun
Albion	Newton	Thomas
Cartwright	Ridgway	Thorns
Edwards	Rivot	Other Papers.
Fallowfiel	Scholzig	Aristotype
Ford	Scott	Obernetter
Hogarth	Self-toned	Ferro-prussiate

The following were described in "Photography Annual," 1891:—

Agathos ...	.. Prestwich	Jacoby S. Emul.	...Schölzig	Sen. Albumen	...Wilton
Argentic Plat.	...Vevers	Sen. Albumen	...Blackfriars	,,	...Wratten
Beta	...Marion	,,	...Elliott	Sen. Silk ...	...Marion
Blanchard's Plat. ...		,,	...Fenn	Sepiatype ...	...Sharp
Celerotype ...	...Blackfriars	,,	...Tear	Thula Plat..	...Rudowsky
Direct Plat.	...Hardcastle	,,	...U.S Co.	Transparency	...Vevers
Fallowfield's Sil. Emul.		,,	...Verel		
Jacoby's Plat.	...Schölzig	,,	...Whelpton		

Note.—The prices will be found at the end of the part.

231.—**The Ilford Printing-out Paper** (Britannia Works Co.)

Considerable interest was aroused at the end of last year by the announcement that this well-known firm intended to produce a new gelatino-chloride paper, and its appearance was anxiously awaited. Now we are in full possession of it, and it has been discussed and tried pretty fully. In my hands it has worked thoroughly well, printing quickly, toning easily, and possessing an advantage over former silver emulsion papers, that of hardness of the film without much loss of depth and brilliancy, if any. Those who have worked in hot weather know how extremely difficult to handle some of these papers are; the slightest touch damaging the film. As, however, the new paper is now so well known, it is not necessary to say very much. But the increase of size in the paper should be noticed. They are 24½ inches × 17 inches, which certainly in the smaller sizes gives a greater number of prints. This will be seen later on in the instructions as to cutting, but it makes the Ilford paper come out cheaper than the best sensitised albumenised. The size of the sheets has been planned with the direct view of providing as many pieces as possible, and as little waste. Thus, for cabinets the sheet folds into four each side and 16 result, with ample room for trimming.

Formula and Instructions—

To Open Package.—Pass blade of penknife under cap, and force off.

Storage.—Cut into sizes required, and store unused portion in tin tube or box.

Printing.—This should be done in shade by preference, unless negatives are specially strong in contrast. The image loses very little depth in toning, etc.

First Washing.—For 15 minutes in several changes.

Toning.—Any of the recognised formulæ for this class of paper may be used, either simple toning or combined toning and fixing; but for simplicity and excellence of results we recommend the following:—Water, 16 oz; sulphocyanide of ammonium, 30 grains; chloride of gold, 2½ grains. The prints tone in this bath in about six minutes, and should be withdrawn when there is just a trace of warmth in the heaviest shadows on looking through the prints. On the surface they will appear overtoned, but this will alter in the fixing bath. This toning bath *can* be used at once, but preferably should stand 24 hours before use. When it becomes dirty or refuses to tone properly, a new one should be made, using the clear portion of the old bath as part basis for the new one.

Second Washing.—For five minutes in several changes.

Fixing.—Use new solution for each batch of prints. The following is best strength:—Hypo, 3 oz.; water, 20 oz. Fixation is complete in about ten minutes.

Final Washing.—For at least two hours in running water, or many changes.

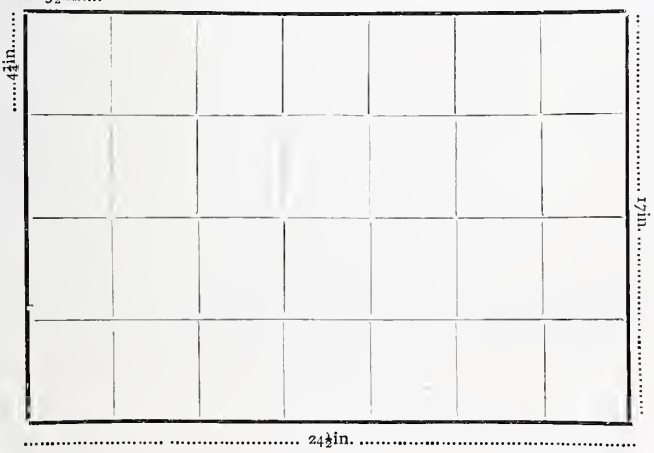
Drying.—Hang up by clips and allow to dry naturally, or if enamelled or matt surfaces are required, squeegee, whilst still wet, on to talced, polished or ground glass: paste sheet of waterproof paper on prints, and both will strip off together when dry. Mounting can then be done as usual.

Alum Bath.—If weather is hot, and surface of prints become soft, immerse for ten minutes in alum bath (water, 20 oz.; alum, 4 oz.), after the first washing and before toning; then wash for ten minutes before putting into toning bath.

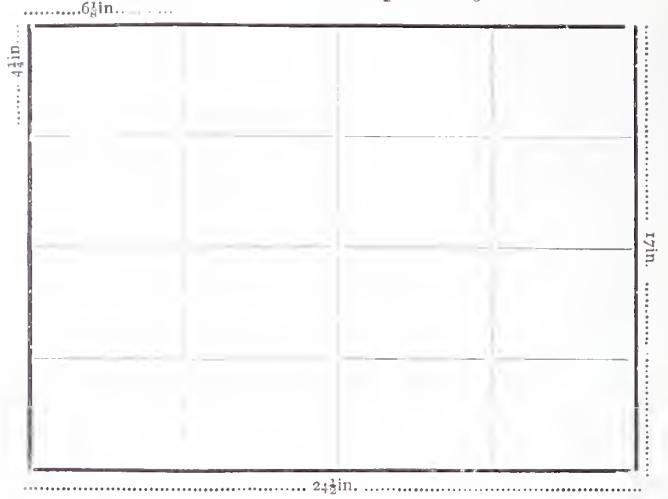
Special Notes.—Do not use any excess of sulphocyanide over quantity mentioned. Use the washing water and all solutions as cold as possible. Keep the prints moving whilst in the various solutions. Papers of this class require care in keeping, and should not be kept too long.

Cutting the Paper.—The following diagrams may be found useful in cutting up the paper ready for the frame:—

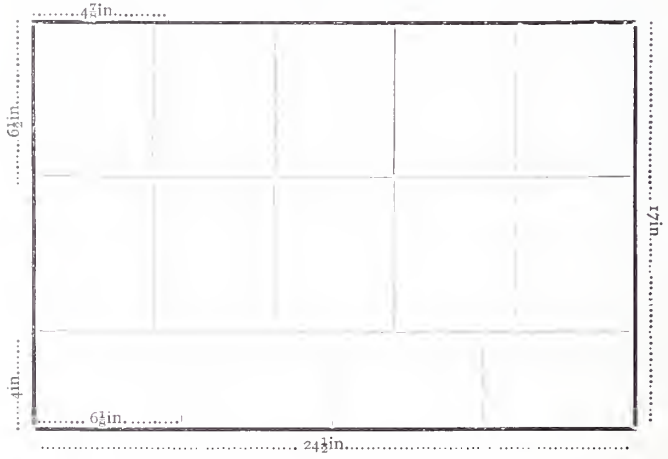
Quarter-plate—28 Pieces, 3½in. × 4¼in.



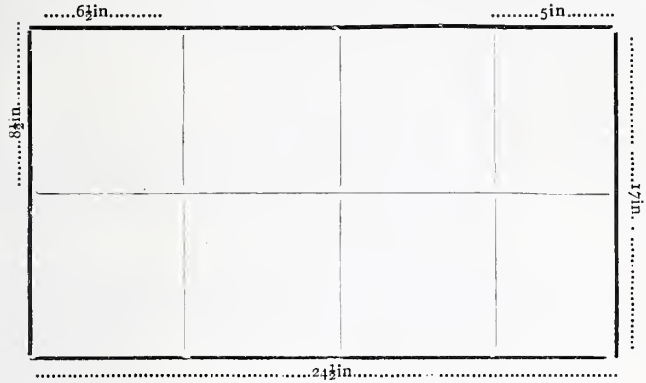
CABINETS—16 PIECES, $4\frac{1}{4}$in. × $6\frac{1}{8}$in.

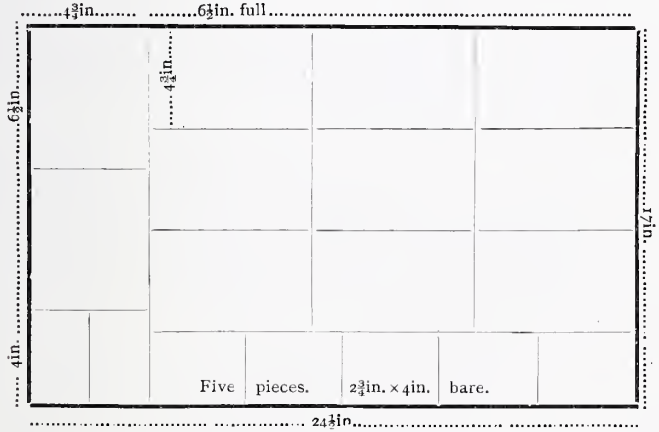


HALF-PLATE—10 PIECES, $6\frac{1}{2}$in. × $4\frac{7}{8}$in.
4 ,, $6\frac{1}{8}$in. × $4\frac{1}{2}$in.



WHOLE PLATE—6 PIECES, 8½in. × 6½in.; 2 PIECES, 8½in. × 5in.





232.—**Matt-Surface** (A. H. Baird).

This is of course treated in exactly the same way as ordinary albumenised paper. A feature, however, is that a pleasing sepia tone can be obtained if desired, by fixing, without toning, in a weak hypo bath, say 1 in 40 for 15 or 20 minutes, then washed and dried as usual. Like platinum papers, it can be dried in front of a fire, as there is no albumen, of course, to be affected by too great heat. It tones well in the acetate and borax baths, also in a combined toning and fixing solution.

233.—**"Papier Simplex"** (Mark Smith).

This is evidently a chloride paper of German manufacture. Be that as it may, it is extremely simple to work, and tones in the combined bath with great ease The prints in my hands resulted in tones of the purple-black order. I understand that Mr. and Mrs. Francis Clarke use this paper exclusively, and as they frequently exhibit, this should be a good recommendation. I find it extremely simple to work.

Instructions—Place in printing frame in usual way and print until heavy shadows are slightly bronzed; put direct into toning and fixing solution *without washing*; tone until on looking through print all red has disappeared and wash for half-an-hour in running water, when it will be ready to mount in the usual manner. Use only a small quantity of the toning and fixing solution to start with and add fresh portions as bath gets weaker in action.

234.—**"Criterion" Printing-out Paper** (Birmingham Photo Company).

Another candidate for public favour, and one just introduced. The sheets are larger than even the Ilford brand, being 24 x 19. It certainly gives first-class results, and is worked in precisely the same way as other brands. In fact, were it not for a system of marks on the back of my prints, there would be hopeless confusion as to which is which and who's who. It seems to have a less tendency to curl than some makes, but this may be fancy on my part.

Instructions—Keep paper in tin box or tube to insure being perfectly dry. Print about same depth as for albumenised paper, and then wash in several changes of water for about a quarter of an hour; they must not remain in the first bath for more than a minute or two. If the "Criterion" combined fixing and toning bath is used, prints are placed directly into the toning bath without previous washing.

Toning.—"Criterion" printing-out paper tones well with any of the usual formula for chloride emulsion papers, and also with the ordinary acetate or borax toning bath. The following is an excellent bath. Water 20 ounces. Sulpho-cyanide ammonium 40 grains. Chloride gold three grains. In best condition after being made at least 24 hours. Tone till the red colour has nearly disappeared, when examined by transmitted light. When exhausted, replenish with fresh solution made in same way as above, only using part of old bath in place of water. After toning, wash well in several changes of water, and fix for ten minutes in hypo 3oz., water 20oz. Use fresh solution each time. Wash in running water with frequent drainings for two hours.

Alum.—If any tendency to prints becoming soft, immerse for about ten minutes in a solution of alum, 2oz. to pint of water, previous to toning. Wash for about five or ten minutes before putting into toning bath.

235.—**The "Jacoby" Collodion** (Otto Schölzig).

This is a paper in which collodion and not gelatine is the medium used for carrying the sensitive salts. Mr. Otto Schölzig has secured the English agency for this paper, and sends a packet. The paper is sent out

tinted in the usual photographic tints, or white as may be preferred, and can be treated in precisely the same manner as ordinary albumenised paper. It gives a very fine result, so far as detail is concerned; indeed in this respect it is nearly, if not fully, equal to any of the gelatine emulsion or aristotype papers on the market. It tones equally and to a pleasant purplish colour, and can be mounted in the same way as ordinary silver paper prints, but the squeegeeing process and drying upon glass, which is so largely utilised for the aristotype papers, is unsuitable for it. It is recommended that a combined toning and fixing bath be used, though it will tone in any other bath which the photographer may be in the habit of using.

Instructions—Treat the paper exactly the same as ordinary ready sensitised albumenised paper without the usual precautions to prevent blistering, or tone and fix in the combined bath without previous washing. The combined toning and fixing bath is made up as follows :—

No. 1 Solution.

Hyposulphite of soda	7 ounces.
Sulphocyanide of ammonium ..	5 drachms.
Acetate of lead	2½ ,,
Water	25 ounces.

No. 2 Solution.

Alum	80 grains.
Citric acid	80 ,,
Nitrate of lead	2½ drachms.
Water	11 ounces.

Mix No. 1 and No. 2 together; put in about ¼ sheet of sensitised paper cuttings and let it stand for 24 hours; then filter and add slowly ½ ounce of 1 per cent. gold solution (one 15 grain tube of gold in 3½ ounces ofwater). The above quantity of toning bath will tone about 20 to 24 sheets of paper, but after 10 to 12 sheets, 3½ ounces of hypo in 7 ounces of water must be added. The prints should be placed direct into this bath without washing. After toning and fixing, wash in running water for half hour. Platinum toning, such as recommended for other papers, also gives very fine results, but the prints must be rather over-printed. The prints when thoroughly dry can be burnished or rolled same as albumenised paper.

236.—**Soltype** (Fry Manufacturing Co.)

An entirely new paper just placed upon the market, the idea being based upon the process of Mr. Lionel Clark. It runs on the artistic side like the firm's naturalistic brand of bromide paper. The prints sent for inspection are really beautiful, whether on paper or opal, and the operations of toning and fixing are just the same as for albumenised paper. This process will certainly be seen at our exhibitions in the future, the red tone being one that has lately been much patronised.

Instructions.—After printing to the required depth, pass the prints through a bath of clean cold water for five minutes. Three successive washings of five minutes each must be given. It is not absolutely necessary, but it is a distinct advantage, to pass the prints through a bath containing ten per cent. of ordinary table salt (chloride of sodium). Regularity of tone is then to be relied upon. After the salt bath, give the prints a rinse and pass them into the toning bath. Should any of the salt bath be taken into the latter, it is not detrimental. It is recommended to tone and fix in separate baths. Use toning bath made in the following way :—

Borax Toning Bath.

Borax	1 oz.
Hot water	25 ,,
Chloride of gold	4 gr.

When cold, bath is ready for use.

This bath gives its best results the first time of use. It is recommended to use a fresh bath every time of toning. We believe that an acetate toning bath can be used repeatedly, but our best experience has been with the borax bath, and for that reason we recommend it. The colour must be judged by looking through the prints, not at them. After the prints are toned, rinse them in a bath of clean cold water. The prints must be kept moving, or toning may go on in one part and not in another. It is not necessary, but it is advantageous, to pass the prints straight from the toning bath into a bath of common salt and water, strength 10 per cent. The next process is fixing. This is effected in a 10 per cent. bath of hyposulphite of soda.

Fixing Bath.

Hyposulphite of soda	2 oz.
Water to make	1 pint.

This strength is necessary. It must be a weak bath, and not approaching the strength used for fixing negatives. The prints should remain in the fixing solution for fifteen minutes, and it is equally important that they should be moved in this as in the previous operations. It is not absolutely necessary, but it is an advantage in the sense of probable permanency, to pass them through a second fixing bath of the same strength. After fixing, the prints must be washed, if possible, in running water, for three or four hours; if not, in many changes of water. In case a large supply of water is not available, a very good method consists in changing the baths of water frequently, between each change pressing the prints between the folds of blotting paper, so as to absorb as much moisture as possible. When placed in the next change the pores of the paper are filled up with clean water, which has a free opportunity to dissolve any hyposulphite of soda still within them. This last operation may be varied by placing the prints face downwards on a piece of glass and absorbing the water by a clean linen towel.

237.—**"Celloidin"** (J. Fallowfield).

A new paper which gives the advantage of quick drying, if necessary, because it can be dried off in blotting paper, a feature not possessed by all papers of this nature. It prints very rapidly, and in toning I found the combined bath to work excellently. There is a considerable range of tone obtainable, with care in the printing first, because that makes considerable difference. If squeegeed down to glass in the ordinary way a very fine glaze is obtainable, or the paper may be burnished like silver prints. The paper sent for trial is of a fine mauve tint.

Instructions.—To print, proceed in precisely the same manner as for albumenised paper, but carry on same until the shadows are decidedly bronzed, as the fixing bath has a decided tendency to bleach, and if not printed very deep you are apt to get dull results, but if it is done as shown above, bright, clear, crisp and vigorous results will be obtained. Any of the combined toning and fixing baths for emulsion papers can be used, but the following is recommended:—

Distilled water	20 ounces
Hyposulphite soda	4 ,,
Ammon. sulphocyanide	½ ,,
Acetate lead	1 drachm
Nitrate lead	1 ,,
Powdered alum	1 ,,
Citric acid	1 ,,
Chloride of gold solution (1 gr. in 1 dr)	4 ,,

When this is first mixed it becomes turbid, but soon settles when standing for a day, and is then ready for use. Same can be used over and over again until exhausted. Don't wash before putting into toning bath, put straight from the printing frame, after desired tone has been obtained; wash well for 15 to 25 minutes. Don't get prints on top of each other in toning bath, or imperfect toning will result.

238.—**"Luminotype"** (Adams & Co.)

A silver emulsion paper of excellent quality, which prints rapidly, and tones easily in either the combined or borax baths. Messrs. Adams and Co. do not recommend any special bath, but I have found a borax formula to work excellently for blue-black tones. For tones of a warmer brown nature, carbonate of soda is good. With platinum, too, it works extremely well.

239.—**Damp-resisting Backing Paper** (Geo. Wheeler & Co.)

Gelatino-chloride papers are becoming more used every day, and these backing papers help us out of the difficulty when we wish to mount the print with a fully enamelled surface. The white side is attached to the print whilst yet upon the glass, and the two allowed to dry together. When stripped off, though but little thickness is added to the print, it is rendered more rigid and easier to handle. To mount, the polished or enamelled black surface is pasted over, and the print placed upon the cardboard. As the paper is waterproofed the enamel is not affected by the moisture going through, which would be the case if the backing paper was not used. The sheets are ready cut to the requisite sizes, just a shade less than the prints they are intended to back, so that there is no overhanging edges. Not having done much in *mounting* enamelled prints, my first trial was only moderate, but the second proved how easy the whole thing was rendered by these backing papers.

Prices of Print-out Paper (Cut Pieces).

		¼ PLATE.	½ PLATE.	¼ PLATE.	12 × 10
		s. d.	s. d.	s. d.	s. d.
234	"Criterion" Gel.-Chl. ....dozen	0 7	1 3	2 4	5 0
235	Jacoby's Collodion..... ,,	—	1 0	2 0	3 9
236	"Soltype" ..... ,,	0 8	1 6	2 6	6 6
237	"Celloidin" Collodion .... ,,	0 8	1 3	2 6	4 6
238	"Luminotype" Gel.-Chl... ,,	0 8	1 7	2 8	6 0
239	Damp-resisting Backing 100	0 6	1 0	1 6	—

Prices of Plates, Films, &c.

		¼ PLATE.	½ PLATE.	¼ PLATE.	12 × 10	15 × 12
		s. d.	s. d.	s. d.	s. d.	s. d.
208	Ilford Isochromatic Plates ..... per doz	1 6	3 8	6 6	16 0	24 0
209	Ilford "Red Label" Plates..... ,,	1 6	3 8	6 6	16 0	24 0
210	"Imperial" Plates ..... ,,	1 0	2 3	4 3	10 6	18 0
211	"Black Band" Plates ..... ,,	1 6	3 6	7 6	15 0	—
212	"Nys" Plates ..... ,,	1 0	2 3	3 9	10 9	18 0
213	Elliott's" "Studio" Plates..... ,,	1 0	2 3	4 3	10 6	18 0
214	Carbutt's Celluloid Films ..... ,,	—	—	—	—	—
215	Edwards's Isochromatic Films.. ,,	1 6	3 8	6 6	16 0	24 0
216	Edwards's Landscape Films .... ,,	1 6	3 8	6 6	16 0	24 0
217	Adams's Celluloid Films ..... ,,	1 11	4 3	7 4	20 0	31 6
218	Fry's Celluloid Films ..... ,,	1 6	3 8	6 6	16 0	24 0
219	"Professional" Backing Papers, all sizes, 1s per packet.	—	—	—	—	—
220	Cardboard Protectors ..... per 50	0 6	1 0	1 6	—	—
221	Anti-halation Papers ..... ,,	0 6	1 0	1 6	—	—

Prices of Opals, Positive Films, &c.

		¼ PLATE.	½ PLATE.	¼ PLATE.	12 × 10	15 × 12
		s. d.	s. d	s. d	s. d.	s. d.
222	"Criterion" Bromide Opals ..... (6)	1 6		—	—	—
	,, ,, ,, ... (3)	—		2 9	5 3	8 0
223	"Criterion" Print-out Opals ..... (6)	1 6	0	—	—	—
	,, ,, ,, ... (3)	—	—	2 9	5 3	—
224	Fry's Bromide Opals ..... (12)	1 6	3 6	—	—	—
	,, ,, ,, ... (6)	—	—	4 0	9 0	—
225	Carbutt's Positive Films	—	—	—	—	—
226	"Criterion" Bromide Cards ..... (12)	1 9	3 0	6 6	—	—

227. Esmail Enamels. Oval Enamels from 1/6 upwards, according to size; Dichromate of Ammon., 1/1; Esmail Gum Mixture, 1/-; and Developing Powders, 1/6.

Prices of Developed Papers.

		¼ PLATE.	½ PLATE.	¼ PLATE.	12 × 10	15 × 12
		s. d.	s. d.	s. d.	s. d.	s. d.
228	Ilford Bromide .....per doz.	0 6	1 1	1 11	4 0	6 6
229	Eastman Extra Rapid Bromide ..... „	0 6	1 1	1 11	4 2	6 9
230	Kallitype No. 2 (Matt Surface).....per 24	0 11	2 0	3 4	3 9	—
	„ „ (Albumen)..... „	1 3	2 6	2 0	—	—

Prices of Developed Papers (Larger Sizes).

		20 × 16	23 × 17	24 × 19	25 × 21
		s. d.	s. d.	s. d.	s. d.
228	Ilford Bromide .....per half doz	5 9	6 9	7 6	—
229	Eastman E.R. Bromide .....per doz.	—	13 6	—	18 3

230. Kallitype No. 2 (Matt Surface), sheets 26 × 20—3, 3/6; 6, 6/6; 12, 12/3; quire, 24/-.
„ „ (Albumen) .... „ 22 × 17—Single sheet, 1/-; 3, 2/6; 6, 4/6; 12, 8/-; quire, 15/-.

Prices of Print-out Paper (Sheets).

		1 SHEET.	3 SHEETS.	6 SHEETS.	12 SHEETS.	24 SHEETS.
		s. d.	s. d.	s. d.	s. d.	s d.
231	Ilford Gel.-Chl. .....(2 sheets, 1/9)	—	—	4 3	7 6	15 0
232	Matt Surface (Baird)	0 10	2 3	4 0	7 4	14 0
234	"Criterion" Gel.-Chl.....	—	—	4 3	7 6	15 0
235	Jacoby's Collodion	1 2	3 6	6 6	12 6	24 0

238. "Luminotype" Gel.-Chl., per sheet, 24½ × 20, 1/6.

PART VII.

CHEMICALS AND SOLUTIONS.

DEVELOPERS. OTHER SOLUTIONS AND PREPARATIONS. CHEMICALS.

DEVELOPERS.

The following were noticed in the "Photographer's Indispensable Handbook:"—

Pyro-Glycerine ...Edwards
Pyro-Potash ... ,,
Iron ... ... ,,
Transparency ... ,,
Pyro and Ammon...Newton
Pyro and Ammon...Paget
Sulpho-Pyrogallol ..Platinotype
Pyro and Ammon...P.A.S.A.
Ferrous Oxalate ...P.A.S.A.
Pyro and Ammon...Stereo Co.
Potash ... ...Stereo Co.
Oxalate ... ... ,,
"Invicta" ... ...Jones
"Universal" ...Mayfield
Developing Tubes ..Marion

The following were described in "Photography Annual," 1891:—

Adams's Hydro ...
Aptus, Eikon ...Sharp
Aptus, Fer. Oxl. ... ,,
Aptus, Hydro ... ,,
Aptus, Sulpho-pyro. ,,
Becker's Hydro ...
,, Pyro Ammon.
,, Pyro Potash
Challenge ...Adams
Cosmopolitan ...Becker
Developoids ...Powell
Drayton ... ...Humphries
Edwards's Hydro...
,, Hydro Trans.
Eikonogen Cartridges Marion
Fallowfield's Hydro
,, Pyro Ammon.
,, Pyro Ammon.
Fielden's ... ...
Hardcastle's Eikon
,, Hydro
Hinton's Hinto-Kinone
,, Bi-quinol
,, Hydro ...
,, Hinto-pyro
,, Positive...
Hydrokinone Compress
Jumeaux ... ...Briggs
Lewis's Hydro ...
Lockyer's ... ...
Pellettone Devel ...Marion
Photopel ... ...Wyleys
Pocket-case ...Beck
,, ...Stanley
Stanley's Hydro ...
,, Pyro ...
Sulpho-Quinol ...Reynolds
Thomas's Ferrous Oxl.
,, Hydro ...
,, Pyro Ammon.
,, Pyro Potash
White ... ...Secretan
Wratten's Hydro ...
,, Pyro Soda

240.—**Rodinal.**

This name has been adopted simply as a relief to para-amidophenol. For normally-exposed plates, one part is taken diluted with 30 of water. The instructions say that a strong solution develops quickly, and with great contrast. But I have not found it so, for though the image appears very quickly—in fact, almost flashes out at once, the contrast is no greater than when a weaker solution is employed. Moreover, it does not appear to work very much differently when either 1 in 8 or 1 in 40 is the strength. It is very like eikonogen, but I should judge it to be even a stronger reagent than that, and for under-exposure it is invaluable. Its weak point is the difficulty of getting density, and therefore for fully exposed plates it is hardly so suitable, except for studio or other work where thin delicate negatives are desired. It, however, possesses two great attractions—(1) it really does not stain the fingers however long it may be used, and (2) it is economical because of the great dilution, and the fact that it can even then be used over and over again. The sample bottle sent has been used to develop portraiture and hand camera shots, the results throughout being a wonderful grasp of detail but a lack of pluck and vigour. I finished some of my negatives in a hydrokinone solution with very marked and speedy improvement.

Instructions.—In cases of normally-timed exposures develop with 1 part of rodinal, 30 parts of water. If a stronger solution is used it will develop very quickly and with great contrasts. But should a weaker solution be used than above it will work more slowly and delicately. For over-exposed plates add some bromide of potassium or use a solution that has already been employed. For under-exposed plates use a weak solution. Plates

exposed in dull light (landscapes, for instance) should be developed with a strong solution, and those exposed in a bright light with a weak solution. For developing on bromide paper dilute one part of rodinal with 100 to 200 parts of water.

Fixing Bath.—For fixing purposes the ordinary bath of hyposulphite of soda may be employed, although an acidulated bath will always work more reliably. To obtain this, dissolve—

Hyposulphite of soda	20 parts
Sulphite of sodium (crystals)	5 ,,
Concentrated sulphuric acid	1 ,,
Water	100 ,,

Prices, 1/6, 3/-, and 5/-

241.—**Concentrated Pyro-soda** (London Stereo Co.)

This developer is sent out in pairs of bottles of such a strength that for a normal developer it is only necessary to take for each ounce of developer required one drachm of *each* of the two solutions making up to the ounce with water. This is an advance on the system of using odd proportions, by which mistakes may often be caused.

Prices—1/6, 2/6, and 3/6.

242.—**Concentrated Hydrokinone** (London Stereo Co.)

An exceedingly concentrated preparation of hydrokinone, the strength being ten times greater than that required for use.

Prices—1/6, 2/6, and 3/6.

243.—**Hardcastle's** (Hardcastle & Co.)

In sending the sample bottles the firm say that it is quite a new product, being neither hydrokinone, eikonogen, rodinal or pyro. Another feature is that it contains no caustic alkali. It produces negatives clean and bright, very like those made by hydrokinone, but appears more certain in its action, and gives more detail. It is certainly much more energetic in action. Being in two solutions, development is completely under control. It is used as follows:—

Ordinary Exposure.		Over-exposure.	
1 part	A	3 parts	A
1 ,, ...	B	1 ,, ...	B
3 parts	Water.	4 ,, ...	Water.
Under-exposure.		**Much Under-exposure.**	
1 part	A	1 part	A
2 parts	B	2 parts	B
1 part	Water.	No water.	

It is excellent for rapid exposures of any kind.

244.—**The Snap-shot Developer** (B. J. Edwards & Co.)

When trying the isochromatic films previously referred to, it was a good opportunity to see what this developer was like. It is in one solution, and merely requires diluting with water, for ordinary exposures one part to three of water, but for instantaneous shots (hence the title) it may be used full strength, in which state it is exceedingly vigorous. In both action and resulting appearance of negative it is very like para-amidophenol; indeed, probably, it is that new agent. Comparing it, however, with "Rodinal," it is much slower in action as regards first appearance of the image, though the total time necessary to complete the development is not greater. This feature is very useful with isochromatic plates or films, because the dish can be covered over for a much longer period without examination. The snap-shot developer certainly ought to find a place upon the shelf of every hand-camera worker.

Prices—1/3, 2/6, and 4/6.

SOLUTIONS AND PREPARATIONS.

The following were noticed in the "Photographer's Indispensable Handbook":—

VARIOUS.

Pyro Tablets	...Marion
Intensifier	...Edwards
,, ...	...Newton
,, ...	...P.A.S.A.
,, ...	...Platinotope
Toning Essence	...Thorn's
Stickfast Mountant ...	...Hannan's
Photo Adhesive	...Thorn's
Clearing Sol.	...Edwards's
Encaustic Paste	...Thorn's
Hypo Eliminator	...Newton
Indiarubber Mountant ...	...Thomas

VARNISHES.

Appleton & Co.
Edwards & Co.
"Berlin," Thomas.
Thorn's.
Ellis's Retouching Medium.
"Ruby," Thomas.

The following were described in "Photography Annual," 1891:—

VARIOUS.

Backing (Plate)	...Tylar
Crown Polish	...Thorn's
Dead Black	...Sharp
,, ,, ...	...Tylar
Density Reducer	...Fry
Enameloid	...Crane
Encaustic Paste	...Hinton
,, ,, ...	...Lund
Hinto-paque	...Hinton
Hypo Eliminator	...Sharp
Intensifying	...Edwards
,, ...	...Fry
,, ...	...Hinton
Mountants	...B.P. Co.
,, ...	...Fry
,, ...	...Hinton
,, ...	...Lund
,, ...	...Mawson
,, ...	...Tylar
,, ...	...Wratten
Pearl Retouching	...Cowgill
Tomlinson's Spotting ...	...Marion
Toning. Aristo	...Fallowfield
,, ...	...Edwards's
,, ...	...Hinton's

VARNISHES.

Alba	...Hinton
Amber and Chloroform ...	... ,,
Anti-Light	...Tylar
Artist	...Thompson
Clear Negative	...Mawson
Collodion	...Hinton
Crystal	...Lund
,, ...	...Mawson
Dry Plate	... ,,
Extra Hard	... ,,
Flint	...Hinton
Mall	...Lund
Negative	...Fry
,, ...	...Lewis
,, ...	...Lund
Negative Preserver	...Tylar
Protectative	...Crane
Retouching	...Hinton
,, ...	...Lewis
,, ...	...Lund
,, ...	...Sharp
Ruby and Golden	...Hinton
Semi-opaque	... ,,
Substratum	...Lund
Transparency...	...Sharp
Water	...Fry

245.—**Theonine** (MARION & Co.)

The addition of this solution to the fixing bath imparts a good printing colour to the negative, and does away with the necessity of using an alum bath.

Price 1/-

246.—**Combined Toning Bath** (J. FALLOWFIELD).

This is the solution used in trying the celloidin paper, and is sold ready mixed for use. The formula is: Distilled water, 20 ozs.; hyposulphite soda, 4 ozs.; ammon. sulphocyanide, ½ oz.; acetate lead, 1 dram; nitrate lead, 1 dram; powder alum, 1 dram; citric acid, 1 dram; chloride of gold solution (1 gr. in 1 dr.), 4 drams. And it worked well with three other makes of paper tried at the same time.

Price 2/3 for 20 oz.

247.—**Naturalistic Toning** (FRY MANUFACTURING Co.)

Solutions for toning rough surface or other bromide prints, converting the tone into warm sepia or brown.

Price 1/-

248.– **Cresco-fylma** (Hill Bros. & Freeman).

An enlarging process that has attracted considerable attention. Briefly put, it consists in soaking the positive or negative on glass in a special solution, floating the film off, and transferring to a larger piece of glass. In my first trial I was in too great a hurry, but at the second trial the full and proper time was given, and the result a success. It is certainly an expeditious and very simple method of enlarging, say, from ½-plate to to ¼-plate, and so on in proportion. The transfer of the film is not confined to glass, but it is applicable to opals, wood, terra cotta, &c.

Instructions and Hints.—When the photograph has been developed and fixed it is essential that the after washing should be thoroughly performed, and the plate allowed to get perfectly dry before being placed in the enlarging bath, as a wet negative will weaken the solution, and the enlargement will not be so great. All dishes used must be scrupulously clean, and the water changed between each enlargement. Slow development with an excess of bromide, and as little accelerator as possible is to be preferred. Any of the ordinary developers are suitable, but in practice we have found that plates developed by hydroquinone give the most reliable enlargements. In the case of pyro-ammonia developed plates a preliminary bath will be necessary of acetate of soda, one drachm to the ounce of water, and the plate must remain from ten to fifteen minutes in this, and, when drained, placed without washing into the enlarging solution. If these be used as developers, our solution will enlarge a quarter to cabinet, and a half-plate to a whole-plate.

The solution will be found to act differently upon the films according to the developer that has been employed. Hydroquinone developed films will generally lift with very little frilling, but when pyro-ammonia has been used it will first frill and then crinkle all over the surface. The final result, however, will be the same. The plate should remain in the enlarging solution for a few minutes after being quite detached from the glass, and then removed on its own plate to a dish containing water. The film will not enlarge to any great extent in the solution, the greatest effect taking place in the water. In ordinary cases the film should be allowed to remain in the water fifteen or twenty minutes, but if from using a badly-washed negative distortion should take place, the time should be extended to an hour or more, so as to thoroughly remedy this defect, and then removed from the bath to its final support. The film should lie on a level surface to dry, and afterwards be thoroughly washed. The operator should not manipulate the film more than is absolutely necessary, nor allow it to enlarge beyond the edge of the glass or support. The enlargement, if from a thin negative, may be intensified when dry, the solution having acted as a "clearer" to give transparency in the shadows. If by any chance the film should not enlarge sufficiently in the water, it must be allowed to dry on the glass or support, and again immersed in stronger solution, then finally returned to the water, when the desired effect will take place.

Price 3/6.

249.—**Burnishine** (Hunter & Co.)

A convenient solution for rubbing over prints before passing them through the burnisher. It is easier to use than soap, the rubbing in of the latter in a dry state being fairly hard work. Moreover, it is more cleanly, and not so messy. "Burnishine" is rubbed over the print with a piece of cotton wool and allowed to dry.

Price 1/- per bottle.

250.—**"Luminotype" Bath** (Adams & Co.)

This is a combined toning and fixing bath, for the "Luminotype" paper, but also especially suitable to the new Ilford print-out paper. It works capitally.

Price 2/3 per bottle.

CHEMICALS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Eagle Gold. C. E. Elliott. | Elephant Gold. Thorn's

The following were described in "Photography Annual," 1891.

Chemical Price List ... ...
Eikonogen ... ... Marion.
Soda, Hyposul. ... ... Richardson.

251.—Chemical Price List.

In order to render this work as useful as possible in the direction of reference, the present prices of the most generally used chemicals for photographic purposes are quoted. They must, however, be taken as approximate only, as some of them are very subject to the fluctuations of the market.

	Per oz. s. d.	Per oz. s. d.
Acid, Acetic glacial	0 2	1 0
,, Benzoic, from gum, B.P.	1 0	—
,, Boracic, pure crystallised	—	1 0
,, Carbolic, pure re-crystallised, in 1 oz. bottles	0 8	—
,, Citric, pure crystallised	0 3	2 2
,, Formic, commercial, 1130°	0 2	2 6
,, ,, pure, 1200°	1 6	—
,, Gallic B.P.	0 6	5 6
,, Hydrochloric pure, re-distilled, 1160°	—	1 0
,, ,, commercial	—	0 4
,, Nitric, pure, for analysis	0 2	1 6
,, ,, ,, 1360	—	0 10
,, Oxalic	0 2	1 0
,, Perchloric, 1110°	1 6	—
,, Picric	0 6	—
,, Pyrogallic, Schering's (in 1 oz. bottles)	—	—
,, ,, ,, (in 1 lb. tins)	—	—
,, ,, (Byks) (in 1 lb. tins)	—	—
,, Salicylic, artificial	1 0	—
,, Sulphuric, chemically pure	—	0 9
,, Sulphuric, pure	—	0 4
,, Sulphurous, strongest	—	0 6
,, Succinic	1 0	—
,, Tannic, chemically pure, white powder, free from resinous and colouring matter, readily soluble in water, ether, or alcohol	0 4	4 6
,, Tartaric, in powder or crystallised	0 3	2 6
Ammonia, Liquor, fort, 880°	—	0 8
Per Winchester (bottles included), 3/6.		
Ammonium, Bichromate	0 6	5 6
,, Bromide, English	0 3	2 4
,, Carbonate, resublimed	—	2 0
,, ,, B.P.	—	1 0
,, Chloride	—	0 10
,, Chromate	0 8	—
,, Citrate	0 6	5 0
,, Hydrosulphuret	—	1 0
,, Iodide, pure crystallised	1 9	—
,, Nitrate	0 3	2 0
,, Oxalate, pure	0 4	3 6
,, Sulphocyanide, pure, re-crystallised	0 4	4 0
,, Sulphite, crystallised, pure	0 6	—

	Per oz. s. d.	Per lb. s. d.
Alum, Chrome, re-crystallised	—	0 9
,, ,, ordinary	—	0 6
,, Potash powder	—	0 2
Alchohol, absolute, 795°	0 5	5 0
,, absolute, 825°	0 3	3 6
,, Methylated, 64 o.p., pint 7d., gallon 3/9.		
Aurine	0 8	—
Baryta, Acetate, crystallised	0 6	—
,, Carbonate, precip. by soda	0 2	1 6
,, Carbonate, by ammonia	0 6	—
,, Chlorate	0 6	4 6
,, Chromate	0 4	4 0
,, Nitrate, pure recrystallised	0 2	1 9
,, ,, commercial	—	0 6
,, Sulphate, pure	0 3	2 0
Barium Chloride, pure, recrystallised, B.P.	0 3	2 0
Balsam, Canada	0 4	3 6
Benzole, specially distilled	per pint	2 0
Borax, pulverised	—	0 8
Cadmium Bromide	1 0	—
,, Chloride	1 6	—
,, Iodide, opt. pure	1 6	—
Calcium Bromide	1 6	—
,, Carbonate, precip., pure	0 6	5 0
,, Precipitated chalk, chemically pure	—	0 10
,, Chalk, prepared	—	0 4
,, Chalk, French, in fine powder	—	0 10
,, Chloride, pure (anhydrous)	—	1 4
,, Iodide	—	—
Charcoal, animal, chemically pure	0 6	—
,, Wood charcoal	—	0 10
Chloroform, Methylated	0 4	4 0
,, Pure	0 8	8 0
Copper, Acetate	0 6	—
,, Bromide	3 0	—
,, Chloride, pure	0 4	—
,, Nitrate, crystallised	0 3	—
,, Sulphate, recrystallised, pure	—	1 0
,, ,, commercial	—	0 9
Cotton wool, fine white, No. 1	—	2 0
Dextrine	—	0 10
Erythrosin	3 6	—
Ethers, Methylated, 720°	—	2 0
,, ,, 735°	—	1 6
Eikonogen, per 1 kilo (2lbs. 2ozs. 8drs.)	—	25 0
,, ,, ½ ,, (1lb. 1oz. 4drs.)	—	12 6
,, ,, ¼ ,, (0lbs. 8ozs. 6drs.)	—	6 6
,, ,, $\frac{1}{10}$,, (0lbs. 3ozs. 1dr. 43grs.)	—	3 0
,, ,, $\frac{1}{20}$,, (0lbs. 1oz. 4dr. 51½grs.)	—	1 9
Gelatine, Gold label (French)	—	2 9
,, Photographic (Nelson's)— No. 1.—½lb. packet, each 2/4. No. 2.—½lb. ,, ,, 1/10.		
,, Heinrich's	—	3 6
,, Patent refined isinglass	0 8	—
,, Swiss (for enamelling, &c., &c.)	—	2 9
Gold Chloride, in 15-grain tubes	per tube	1 9
,, ,, ,, ,,	per doz.	20 0

	Per oz. s. d.	Per lb. s. d.
Glucose, Grape Sugar	—	1 0
Gum, Camphor	0 2	2 0
,, Arabic, best (Turkey)	0 6	—
,, ,, ordinary	—	2 6
,, Sandrac	0 2	2 0
,, Damar	—	2 0
Gun Cotton, soluble (Pyroxyline)	1 4	—
,, high temperature	3 6	—
Schering's Celloidin, in boxes, 3/- each		
Glycerine, pure	0 2	1 3
Hydrokinone, Schering's	1 0	—
,, ,, in 1 oz. bottles	1 1	—
,, Byks	1 6	—
,, ,, permanent (Amber Crystals)	2 6	—
Iodine, pure, re-sublimed	1 6	—
,, Bromide	3 0	—
Iron, Ammonia Sulphate	—	0 6
,, Ammonia Sulphate, pure	—	1 0
,, Nitrate	1 0	—
,, Protosulphate, pure, small, crystallised	—	0 2
,, Perchloride	0 2	1 6
,, Protoxalate (Ferrous Oxalate)	0 2	2 0
,, Ammonia Citrate of Iron	0 3	3 0
Kaolin	—	0 6
Lead, Acetate (pure) recrystallised	0 4	2 0
,, Bromide	1 0	—
,, Iodide, B.P.	1 0	—
,, Nitrate, recrystallised, B.P.	0 3	2 0
Lithia, Carbonate, B.P.	1 6	—
Lithium, Bromide	2 0	—
Litmus	0 3	—
Magnesium, Bromide	2 0	—
,, Powder	1 6	—
,, Ribbon	1 6	—
Manganese, Bromide	3 0	—
,, Iodide	3 0	—
,, Black Oxide	—	0 4
Mercury, Metallic, pure redistilled	—	3 6
,, Bichloride	0 4	4 0
,, Sulphocyanide	0 8	—
Nickel, Ammonia Sulphate	0 4	—
Paraffin, pure wax	—	2 0
Potash, Bichromate, recrystallised	—	0 8
,, Carbonate, chemically pure	0 5	5 0
,, ,, B.P.	0 2	0 9
,, Citrate (Neutral)	0 3	3 0
,, Chlorate (crystal)	—	0 10
,, Lactate, syrupy	1 0	—
,, Molybdate	0 4	—
,, Nitrate, pure, recrystallised, B.P.	—	0 6
,, Nitrite	0 3	3 6
,, Oxalate, neutral	0 1	0 9
,, Sulphate, crystallised, B.P.	—	1 8
,, Permanganate	0 3	3 0
Potassium, Bromide	0 3	2 0
,, Chloride, recrystallised	—	1 4
,, Cyanide (sticks)	—	2 0
,, ,, (lump)	—	1 0
,, ,, recrystallised	0 6	—

	Per oz. s. d.	Per lb. s. d.
Potassium, Ferrocyanide, pure	0 3	3 0
,, Ferridcyanide, pure (Red Prussiate)	0 5	5 0
,, ,, commercial	0 3	3 0
,, Ferrocyanide, ,,	—	1 6
,, Iodide crystals, perfectly dry, white, and is warranted not to change colour	1 2	—
,, Oxide (sticks) (potassa fusa), B.P.	0 2	1 8
,, Sulphocyanide	0 6	—
,, Sulphuret	0 2	1 6
,, Meta-bisulphite, in 1oz bottles 5d.	—	3 6
,, Chloroplatinate, in 60-grain tube	—	6 0
Palladium, Chloride Solution	4 0	—
Platinum, Chloride, 15 grain tubes	per tube	1 9
,, Wire	per drm.	6 0
Rouge	0 3	—
Schlippe's salt	0 6	6 0
Soda, Acetate	—	0 7
,, ,, pure, recrystallised	—	0 9
,, Carbonate ,, ,,	—	0 6
,, Citrate (neutral)	0 3	3 0
,, Bicarbonate, chemically pure	—	0 10
,, Biborate (borax)	—	0 8
,, Hyposulphite, recrystallised, 1cwt. 10/-, 14lbs. 1/9, 7lbs. 1/-	—	0 2
,, Nitrate, ,,	—	1 0
,, Phosphate, ,,	—	1 2
,, Salicylate, artificial	1 0	—
,, Tungstate	0 2	1 6
,, Sulphite, recrystallised	—	1 0
,, ,, commercial	—	0 6
,, Caustic	0 2	1 6
Sodium, Bromide, dry	0 4	4 0
,, Chloride	0 2	1 6
,, Iodide, dry	1 6	—
,, Sulphate, pure	—	1 4
,, commercial	—	0 9
Silver, Nitrate, recrystallised	—	3 0
,, ,, double recrystallised	—	3 2
Starch, fine white, in powder	per lb.	0 10
Strontium acetate	0 8	—
,, Bromide	2 0	—
,, Carbonate	—	2 6
,, Chloride, crystallised	—	1 0
,, Iodide	3 6	—
,, Nitrate, pure, recrystallised	—	1 6
,, Nitrate, commercial	—	0 9

Test papers, Litmus books, per gross, assorted, 12/6; per doz, 1/6; each, 2d.
Turmeric, 1 gross books, 12/6; per doz., 1/6; each, 2d.
Turpentine, 9d. per pint; 4/6 per gallon.

Tripoli, best	per lb.	2 0
Uranium, Acetate, per oz. 3/-; bromide, per oz., 6/-; nitrate, pure, crystallised, 2/-		
White wax, best	0 4	3 6
Zinc, Acetate, B.P.	0 3	2 6
,, Bromate	3 0	—
,, Bromide	1 0	—
,, Chloride	—	2 0
,, Iodide	3 0	—
,, Nitrate	0 3	3 0
,, Sulphate, crystallised, B.P.	—	0 6
,, Sulphate, recrystallised	—	1 0

PART VIII.

APPARATUS USED AFTER EXPOSURE.

CHANGING BAGS AND TENTS. THE DARK ROOM AND DEVELOPMENT. WASHING APPARATUS. THE PRINTING ROOM. BURNISHERS AND ROLLERS. MOUNTS AND MOUNTING. VARIOUS.

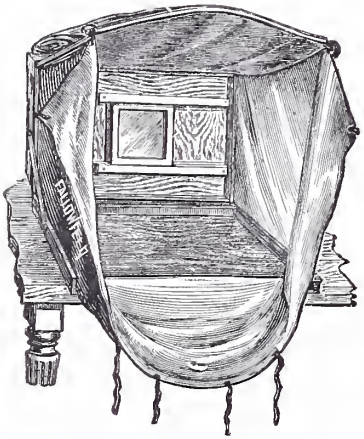
CHANGING BAGS AND TENTS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Cowan's	Houghton's Portmanteau	Semper Paratus
Dale's	Howard's	Shew's Folding
Eclipse'	Marion's Developing Tent	Stanley's
Fallowfield's	Marion's Folding	Wratten & Wainwright's.

The following were described in "Photography Annual," 1891:—

Dry Plate Box Tent	Griffin	Portable Dark Tent	Robinson
Eclipse Bag	Beresford	" "	Preston
Light-tight Bags	Tylar	Pyramid Bag	Vevers
Portable Dark Room	Fallowfield		



No. 252.

252.—**Dark Tent** (J. FALLOWFIELD).

A light tent, which may be used either upon a tripod or more conveniently upon a table, as shown in the illustration. It measures, when closed, 24 × 17 × 5 inches, and weighs only 12 lbs. Plates up to ¼ plate can easily be changed, or even developed, in this tent.

Price, £2 2s.



No. 253.

253.—**Portable Changing and Devel. Tent** (Davenport & Co.)

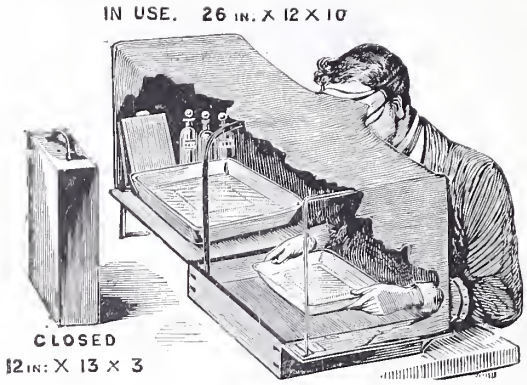
When opened out the space at command is 18 × 24 × 18 inches, which is ample for the majority of plates likely to be so changed or developed. It is constructed for use on a table, and the light iron framework can be put together or taken apart in less than a minute. There are no screws, or interior fittings to worry over, the parts fall into place like soldiers, and when fixed the whole is rigid. The light comes through a non-actinic window in the front. When folded the tent folds up into 24 × 3 inches, and weighs under 5lbs.

Price 18/6.

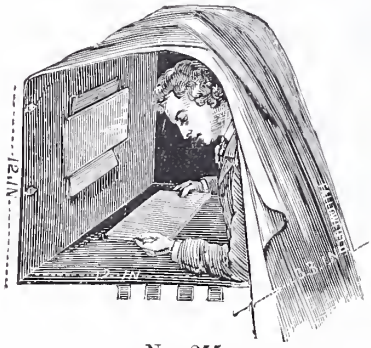
254.—**Portable Developing Tent** (W. Baker).

One of the most compact of tents for either changing or developing plates. When open it is about 24 inches long by 10 wide, and 10 high, without the sink, which is 2½ inches deep. When closed, it forms a box 12 inches square by 3½, in which the collapsible parts of the tent occupy so little space that there is still room for 1 doz. half plates, two developing dishes, two 6-oz. bottles, and several small articles. The sides of the tent are composed of opaque material, and as the light can only enter by the red window, which is guarded by a blind, its amount can be regulated as desired.

Price £1 11s. 6d.



No. 254.

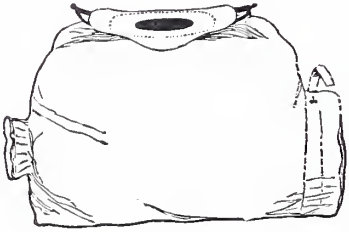


No. 255.

255.—**Portmanteau Tent** (J. Fallowfield).

A very compact arrangement for changing plates when away from home. Size, when folded, 18 × 13½ × 1 Has a working space of 33 inches from right to left. When open the rigid part is 18 inches long × 12 broad × 12 high, and remainder flexible. Weight 4¾lbs.

Price £1 1s.



No. 256.

256.—**Changing Bag** (W. Baker).

A portable changing bag giving the power of sight through an aperture at the top. The light given is safe enough even in strong daylight. The convenience of having the head outside is very great, especially in warm weather. There is also none of that helplessness at a sudden interruption.

Prices—½ pl., 7/6; ¼ pl., 10/-

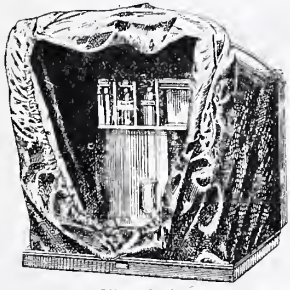


No. 257.

257.—**Changing Bag** (Sheffield Photo Co.)

This is really a combined changing bag and focussing cloth, as it can be utilised for both purposes. It is neat and effective.

Prices—¼ plate, 4/6 ; ½ plate, 5/6 ; ¼ plate, 6/6.



No. 258.

258.—**Developing Tent** (Sheffield Photo Co.)

This has partitions for bottles, orange and ruby glass windows, and tray for developing. When closed, it will hold in addition a ½-plate camera and slides.

Price £1 5s.



No. 259.

259.—**Pocket Changing Bag** (W. Baker).

To change plates in daylight. Convenient and efficient. Fixes to the head of operator by an elastic band, has a ruby window which lights the inside so that the operation of changing can be seen and comfortably done. The remainder of the bag is opaque flexible material.

Price up to ½ plate, 7/6; for ¼ plate, 10/6.

THE DARK ROOM AND DEVELOPMENT.

The following were noticed in the "Photographer's Indispensable Handbook":—

Developing Sink ... ...Houghton		Indiarubber Water Bottles	
Glass Trays ... ... "		Labelled Bottles ... ...Houghton	
Willesden Trays ... ...Tylar		Non-actinic Fabrics ... ...Law	
Rocking Bath ... ...Shew		Ruby Paper ... ...Thomas	
" Tray ... ...Marion		Vulcanite Hook...	
Oscillating Well Tray ... ...Newton		Rubber Finger Stalls	
Tray Covers ... ...Gallimore		Lever Stop .. ..Robinson	
"Tutela" Plate Cup ... ...Newton		Stoneware Troughs ... ...Marion	

LAMPS.

Abney.	Garbutt's Multum in Parvo.	Reservoir.
Amateur.	Gas Burner.	Sands and Hunter's.
Bon Marché.	Gas Lamp.	Self-feeder.
Climax.	Houghton's.	Sbadowless.
Combined.	Kinnear Burner.	Snell and Brown's.
Compact.	Model.	Special.
Eclipse.	Optimus.	Tourist.
Economical.	Optimus Folder.	Watson's.
Edwards's.	Photographer's.	Welford.
Excelsior Folding.	Redding's.	Wratten and Wainwrigbt's.
Folder.	Regent.	
Folding.		

Tbe following were described in "Pbotography Annual," 1891:—

DARK ROOM LAMPS.

Chadwick ... ...Marion	
Chamelon ... ...Preston	
Cheap Folder ... ...Vevers	
Collapsible ... ...Marion	
Drayton... ... ...Humphries	
Flat Travelling ... ...Marion	
Folding ... ...Tylar	
Gas ... ...Beck.	
Gas ... ...Sutcliffe	
Gas Standard ... ...Stereo Co.	
Hanging ... ...Fallowfield	
Monochromatic ... ...Marion	
Optimus... ... ...P. S. & R.	
Paraboloid ... ...Lancaster	
Perfection	
Phœnix ... ...Reynolds	
Ready ... ...Stereo Co.	
Revolving ... ...B.P. Co.	
Rubralix ... ...Lancaster	
Self-ligbting Burner ... ...Sharp	
" " ... ...Vevers	
Slater's	
Soho. ... ...Marion	
Tylar's	

DEVELOPING APPARATUS.

Brush Tube ... ...Tylar	
Dark Developing Bath ... ...Watt	
Disb Box ... ...Adams	
Dish Screens ... ... "	
Litter, Ebonite ... ... "	
" Folding ... ...Humphries	
" Lever ... ...Birm. P. Co.	
" Plate ... ...Humphries	
" Sloper's ... ...Tylar	
" Thimble ... ...Vevers	
Rockers, Automatic ... ...Birm. P. Co.	
Rockers, Automatic ... ...Shew	
" Little Giant ... ...Hunter	
" Motor ... ... "	
" Pendulum ... ... "	
" Professional ... ...Lund	
Scoop, Ebonite ... ...Adams	
Trays, Acme ... ...Jones	
" Club ... ...Adams	
" Glass ... ...Fallowfie'd	
" Jervis ... ...Wratten	
" Lantern Slide ... ...Adams	
" Pulp ... ...Tylar	
" Rim ... ...Birm. P. Co.	
" Wood ... ...Marion	

MEASURES AND BOTTLES.

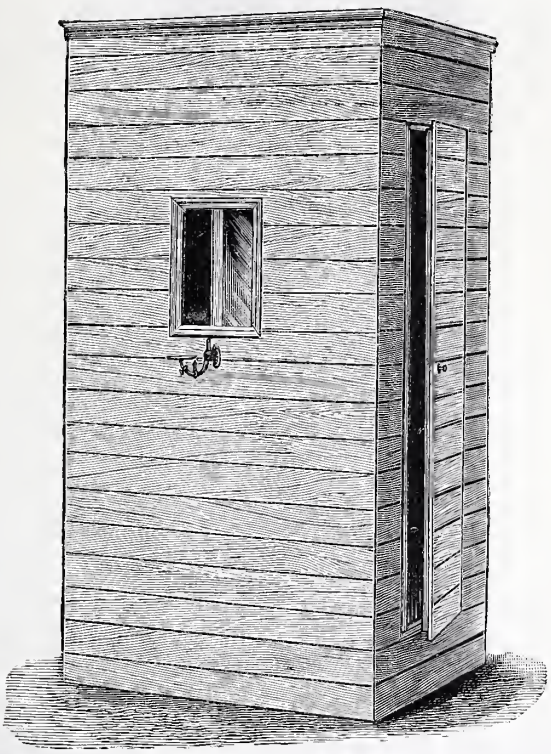
Dropping Tub ... ...Vevers	
Jug ... ...Adams	
Minim Measure ... ...Vevers	
Opaque ... ...Hicks	
Pyro Bottle ... ...Vevers	

SCALES AND WEIGHTS.

Decimal ... ...Blackfriars	
Scales ... ...Adams	
" ... ...Griffin	

DARK ROOM FITTINGS.

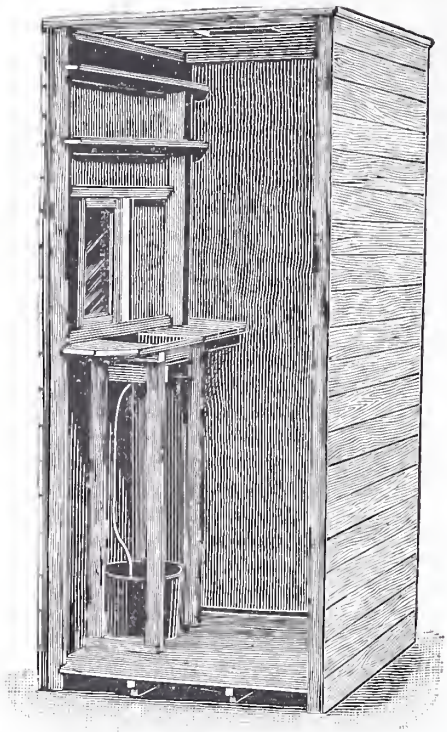
Bottle Holder... ... ...Tylar	
Cistern ... ...Adams	
Dark Rooms Complete ... ...Davenport	
Developing Table ... ...Stanley	
Griffin Stand ... ...Griffin	
Orderly Cupboard ... ...Fallowfield	
Photo Cabinet... ... ...Marion	
Portable Dark Room ... ...Houghton	
Portable Sink ... ...Fallowfield	
Shelves... ... ... Adams	
Swing Rose Tap ... ... "	
" " ... ...Houghton	



No. 260. Fig. 1.

260.—**The "Eveready" Dark Room** (Davenport & Co.)

In last year's Annual I was just able to squeeze in a notice of this cheap and convenient erection. Since that time, however, it has been considerably improved, and a great variety of fittings are now obtainable. I said last year that these dark rooms were simply marvellous at the price, and I see no reason yet to alter that opinion. It is supplied in sections all ready for erection, and although one is supposed to fit them together exactly according to the marking, I found the woodwork so accurate that altering the door from one side to the other was an easy matter, and this was done forthwith to suit the position available. To the amateur who is not married—never mind where the fault lies—and who, no doubt, is constantly changing his "diggings," these rooms should prove very inviting. They are easily taken down, they pack flat for travelling, and in the new abode save all trouble as to mess and inconvenience. The sections—six in number, consisting of four sides, a roof, and a floor—can be easily put together in about five minutes. The roof is provided with a ventilator, while the floor is raised some two inches from the ground, so that a current of air is always circulating. Every board is tongued into its fellow, and the whole can be lined as an extra precaution against light. The fittings consist of two shelves, a lead-lined sink, 12 inches by 9 inches (this size is only suitable for developing up to half-plate, for anything beyond larger sinks should be used), which is provided with a pipe to conduct the waste into a bucket below or to the outside of room. On either side of sink is a bench on which to stand the



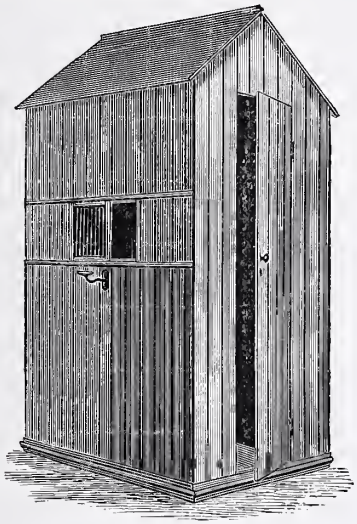
No. 260. Fig. 2.

odds and ends an operator must always have at his fingers' ends when developing. The window—glazed with either ruby or orange glass—works in a slide or groove, so that it can be easily pushed aside when white light is desired. An additional window can be provided at a slight extra cost if both ruby and orange are used. Immediately underneath the window, on the outside, may be fixed an ornamental iron bracket on which to stand an ordinary oil lamp, thus dispensing altogether with the evil-smelling ruby lamp. The sliding window provides an effective and easy method of exposing for lantern slides, bromide, or similar work, the exposure being made by simply opening and closing window. It can be stood in the corner of the bedroom, the kitchen or an outhouse, and, if desired, could be painted, a special roof, and strongly made door provided, and stood out of doors. A water supply can be provided by fixing a small cistern either above the roof or at the back of the room, and connecting it with a tap over the sink.

Prices—	£	s.	d.
6ft. 6in. × 3ft. 6in. × 3ft.	2	2	0
6ft. 6in. × 4ft. × 3ft.	2	10	6
6ft. 6in. × 4ft. × 3ft. 6in.	2	18	0
6ft. 6in. × 4ft. × 4ft.	3	5	6

Extras.—Out-door roofs, 17/6, 20/-, and 22/6. Out-door roof, extra-heavy door and one coat of paint, 18/6; sections of room made to fold in centre, 7/6; sections of room lined with stout opaque paper 4/-; sink, 18 × 12in. instead of 12 × 9, 4/-; extra windows complete with frame and glass, 3/6; water supply, consisting of five-gallon

cistern, brass tap, lead piping and connections, 15/6; rack for dishes, to fit under sink, 5/-; special ventilator, 3/6; grid over sink, 1/6; ornamental iron bracket for lamp, 1/-; extra shelves, 1/- each. Finished in an altogether superior style, with panelled door, and the whole stained and varnished in imitation mahogany, 21/-



No. 261.

261.—**The "Maison Noir"** (Overend & Co.)

The old system of poky cupboards, underground cellars, &c., must have received a considerable shock at the recent enterprise of manufacturers. Here we have a dark room complete, warranted weather, water and light proof, painted inside and out, which can be erected in ten minutes by anybody. I am a wretched carpenter, but when it comes to merely sending home a few screws, especially if all the holes are bored ready, I manage it very well indeed, and feel proud of the erection. The "Maison Noir" is fitted with sink, waste pipe, shelves, ruby and yellow sliding window, and lamp or candle bracket outside for night work. It is well made, and should be a boon to amateurs especially, as it will get them out of many difficulties with the home authorities.

Price £2 10s.

262.—**The "Army" Portable Dark Room** (Davenport & Co.)

This has been specially designed for the use of army officers both at home and abroad. Although in its main details this dark room follows the lines of the "Eveready," it possesses the advantage of increased lightness and portability. This is accomplished by making the sides of material instead of wood. The sliding window and lamp bracket, sink and wash pipe, benches and shelves, and wood flooring resting on joints raised two inches from the ground, have all been retained. The portability of this dark room is proved by the fact that, though it measures 6ft. 9in. × 4ft. × 3ft. 6in. when erected, it occupies a space only 41 × 21 × 12 inches when packed, and weighs about 70lbs., which does not, however, include the fittings. The whole can be taken down, strapped together, and made ready for travelling



No. 262.

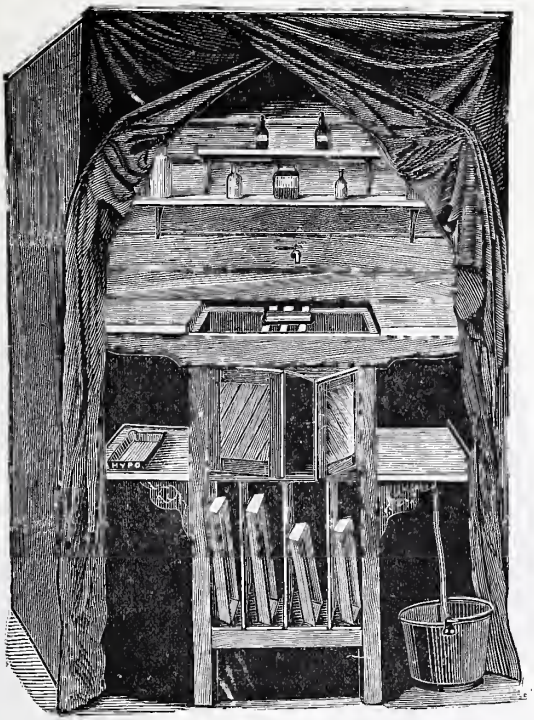
in ten minutes; yet when erected the "Army" is rigid, airy, and comfortable to work. This is essentially an indoor dark room, therefore the finish and general appearance has received attention. The outer cloth is of a deep ruby colour, bound round with thick ruby and gold cord, the outer window frame being varnished a rich gold to match. Nothing faddy or useless has been introduced. They are constructed to stand the rough usage of the camp or barracks, and the anything but careful handling of officers' servants, Custom House officials, and others. The room measures 6ft. 9in. × 4ft. × 3ft. 6in., with a sink 10 × 15 × 2 inches.

Price £4 4s.

263.—**The "Army Junior" Portable Dark-room** (Davenport & Co.)

This has been designed from suggestions made to the manufacturers by an army officer in Ceylon. It is lighter and more portable than No. 262. The sliding window, lamp bracket, shelves and sink are retained, but no floor is supplied. The wooden framework is slight, but being made of seasoned oak is very strong. The outward appearance is precisely the same as the "Army," and it can be as easily taken down, or as rapidly put up, and when erected is perfectly rigid. When packed the measurement is about 41 × 10 × 8 inches, and the weight, without fittings, between 40 and 45lbs. In use it measures 6ft. 9in. × 4ft. × 3ft. 6in., and has a sink 10 × 15 × 2 inches.

Price £4 4s.



No. 264.

264.—Combined Sink and Dark Room (Davenport & Co.)

The above illustration represents one of the developing sinks (No. 269), with the addition of a folding hood cover, making it a complete dark room in itself. When drawn forward, the curtains exclude all light excepting such as comes through the window, which is either ruby or yellow fabric. When not in use, the hood can be thrown back, and the size of the room considerably reduced. These combined developing sinks and dark rooms are of good appearance, and no disfigurement to the studio or reception room. The outer material may be had either black or of a deep ruby colour as desired.

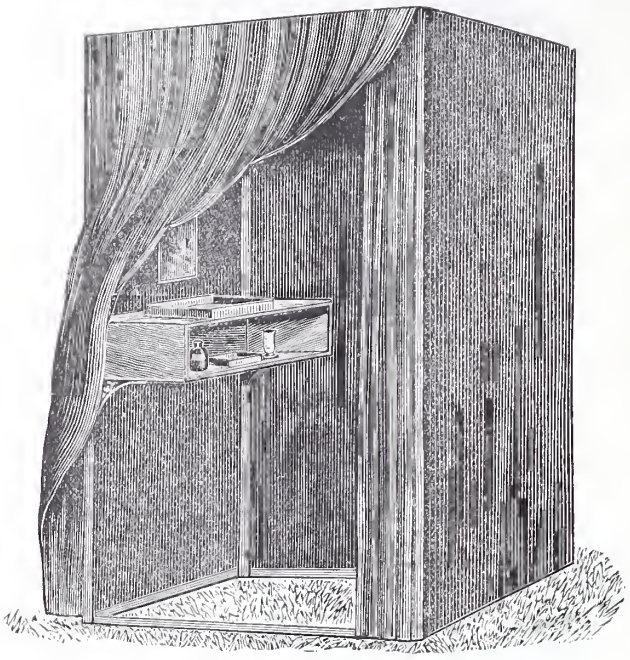
Prices—

With sink 16 × 18, extreme width 3ft. 6in.	..	£5	0	0
,, ,, 24 × 18, ,, ,, 4ft.	..	5	7	6
,, ,, 30 × 20, ,, ,, 5ft.	..	6	0	0

Extra.—Water supply, consisting of five-gallon cistern, piping, and all connections to tap over sink, 14s. 6d.

265.—The "Zephyr" Portable Dark Room (Davenport & Co.)

This is an ingenious construction for meeting the wants of those who desire a cheap, essentially portable, and fairly spacious dark room. When erected, it will be found rigid enough for all purposes. The light wooden framework is easily and quickly put together, and as readily taken apart. When packed, is very little weight, and it occupies but a small space. It



No. 265.

will be seen from the above illustration that the travelling case is utilised as a bench and as a receptacle for bottles, dishes, measures, &c.

Prices.—6ft. × 3ft. × 3ft	..	..	£2	0	0	Case and sink	£0	7	6
6ft. × 3ft. 6in. × 3ft. 6in.			£2	2	0	Ditto	£0	8	6
6ft. × 4ft. × 4ft.	..	..	£2	10	0	Ditto	£0	10	6

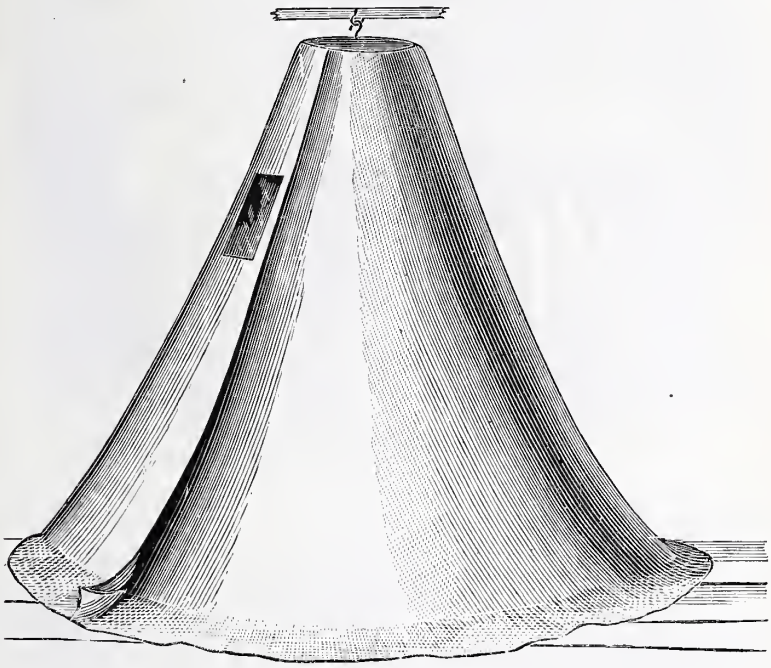
266.—**The "Boudoir"** (Davenport & Co.)

The "Boudoir" is the only dark room for which the firm claim *beauty of appearance* as the distinctive feature, and it is, they believe, the only dark room in the world specially intended and adapted for lady amateur photographers. Being of elegant appearance, it is very suitable for standing in the boudoir, or, indeed, in any room, and when travelling or visiting friends, portable enough to form part of a lady's luggage, and so easy to erect that the owner may, if necessary, do it herself without assistance. The framework of the "Boudoir" is composed of prettily marked and polished bamboo rods, and the sides are of suitable thicknesses of fabric, the outer thickness being of rich sateen of a deep ruby colour. Unlike the "Zephyr" dark room, the framework of the "Boudoir" is not inside, but *outside* the room, and the fabric hangs inside the rods. This arrangement is found to greatly facilitate the erection of the room, as the rods have simply to be jointed together, and the fabric hung to rings which are provided on the topmost rods, and it is kept well in place, and the beauty of the structure greatly enhanced by the festooning of heavy gold cord in suitable places. The "Boudoir" is well ventilated, and light is provided for

by a ruby fabric window. The weight of a 6ft. × 3ft. × 3ft. room is only 20lbs., while it packs into a space 6in. × 6in. × 36in.

Prices—

6ft. × 3ft. × 3ft.	6ft. × 4ft. × 4ft.	6ft. × 3ft. 6in. × 3ft. 6in.
£3 0 0	£3 15 0	£3 7 6

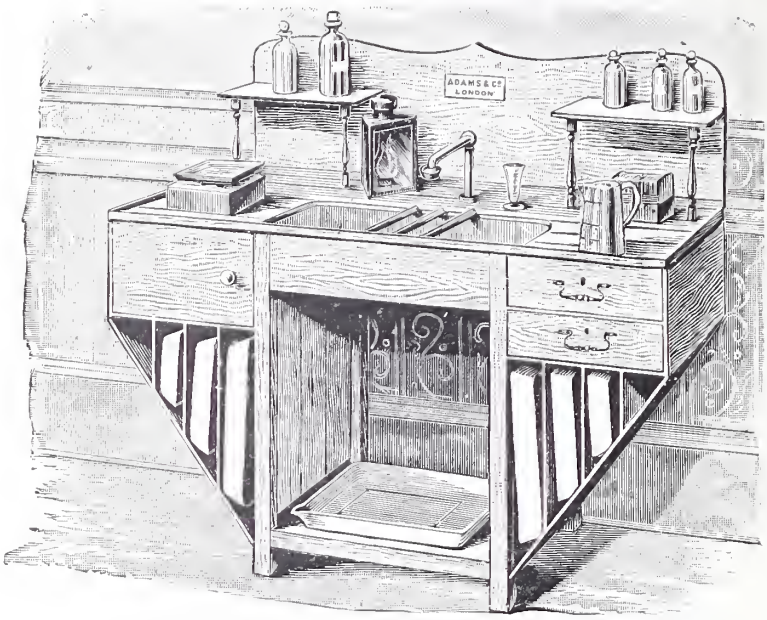


No. 267.

267.—**The "Conical" Dark Tent** (Davenport & Co.)

The principal feature of this pattern is its great portability; as will be seen by the illustration it largely resembles the well known military bell tent in shape. Amateurs or professionals who are constantly moving from place to place, and tourists and travellers generally, will find it a perfect boon. It is made of suitable thicknesses of suitable material, and is, as its name implies, conical in form. It measures about 8 ft. to apex and about 16 ft. in circumference at base. The "Conical" dark tent has no supporting framework of any kind; when required for use it must be suspended, by means of a ring in the apex, from a nail in the wall, the window sash fastener, a gas chandelier, or in any similar manner. The table and chair of the operator will keep the sides of the tent apart, and a square of ruby fabric admits a safe working light. If used in the open air the "Conical" dark tent can be suspended from the bough of a tree, or even the camera tripod could be pressed into service.

Price £1 7s. 6d.



No. 268.

268.—**The "Club" Sink** (Adams & Co.)

A more complete and elaborate sink than No. 273. It measures 4ft. 10in. × 2ft. × 3ft., and is made of stained and polished pine. The sink is 24 × 17 inches, and either of vitrified enamel or of lead. The tables on each side are a good size, and for travelling the whole of the back portion, with shelves, &c., folds down flat. As will be seen, there are two drawers and one cupboard.

Prices—Enamel sink, £5 10s.; lead lined, £5 15s.

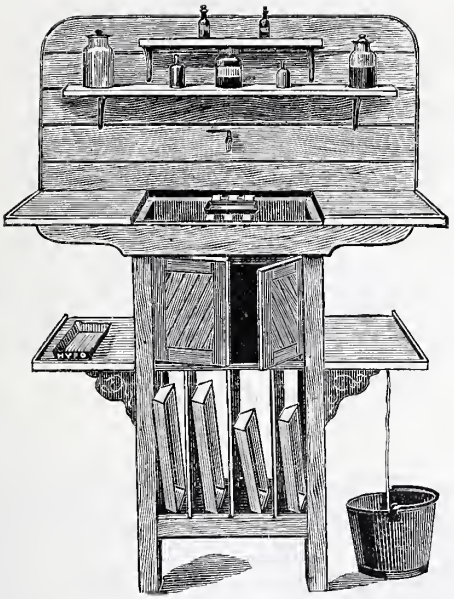
Extras.—Swing rose tap, 6/6 to 13/- Dishes, etc., as required.

269.—**Developing Sink No. 1** (Davenport & Co.)

This sink is fitted with a pipe for waste, which can be discharged into a bucket at the side, or conducted direct to a drain. The two lower benches are especially useful for the hypo bath, &c. Immediately under the sink proper is a cupboard for storing plates, printing paper, gold solutions, and similar articles. The shelves are sufficiently large to hold all the chemicals usually employed. A brass tap for water is supplied, but a swing rose tap can be fitted at an extra charge. The whole structure is well and strongly made, and coated with good shellac varnish.

Prices—

With sink 16 × 18;	extreme width,	3ft. 6in...	£3	3	0
,, 24 × 18	,,	4ft. ..	3	10	6
,, 30 × 20	,,	5ft. ..	4	0	0



No. 269.

270.—**The Antiphoton** (Wormald & Co.)

The ventilation of the dark room is a subject that receives, as indeed it should do, occasional attention in the press. The only trouble, however, is to permit the free passage of air without admitting light, and the Antiphoton provides the means. Of course the idea is not new, but people have had to construct their own up to the present, and in this respect the selling of a ready-made one is a novelty. It is constructed of japanned iron or tin, and is provided with a flange to screw upon the partition or wall, if it be of wood, as the majority are. A covering hood is provided so that the Antiphoton can be placed outside, the hood serving to protect from rain and direct rays of the sun. Altogether, it is a useful little thing, providing in itself a complete ventilator, at a moderate cost.

Price 4/6.

271.—**Hunter's "Light Filter"** (Hunter & Co.)

A deep orange light is given by this medium or fabric which, whilst ample enough for anyone, is yet perfectly safe. I tested it by exposing a ¼ plate ordinary "Lumière" (which is certainly a rapid plate) for five minutes, one part being covered by a two-shilling piece. A penny would have done just as well, I know, but a florin reads better. Upon development, I could find no trace of the "monish"; there was no "change." I have met with this result in household matters before, but a five minutes' exposure to strong daylight, through some canary mediums, has not been quite so satisfactory. This medium is sold in sheets, 30 × 20 inches, at the moderate

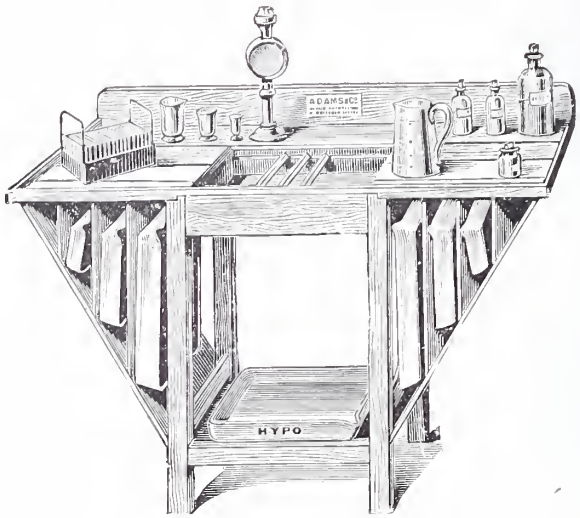
Price 1/-

272.—**The "Rational"** (Davenport & Co.)

This may be termed a travelling combined laboratory and developing sink. It is intended for the use of photographic societies who have no convenience for the permanent erection of a dark room, and for travellers

and tourists, whether at home or abroad. It consists of a full-sized chemical cabinet; a developing sink, 7 × 20 × 23in., with benches at sides and shelf underneath; a 25-gallon cistern, and a dark room, 6ft. × 4ft. × 4ft, all of which may, within ten minutes, be packed into a space of 20 × 20 × 23in, and is then in a fit and safe condition to be sent to any part of the world by rail or sea without the possibility of damage to sink, cistern, or glass bottles. The dark room is made of suitable fabric supported by light rods, which are easily disconnected to allow packing in the cistern. When erected there is ample room inside for operator, developing sink, and all etceteras. Light is obtained through the ruby (or orange) window in front of operator; when white light is desired the window can be thrown open. In fig. 2 the upper part is the sink, into which the chemical cabinet with its contents has been folded; and the lower part is the cistern, containing dark room and any apparatus desired. Suitable connections for rubber tubing to convey water from the cistern to tap over sink, and others to provide an outlet for waste, are fitted.

Price £9 9s.



No. 273.

273.—**The "Challenge" Sink** (Adams & Co.)

This is well made, of polished pine, and is handsome in appearance. The sink portion is made of lead, and has two ridges on either side to permit the use of a sliding rack. The top is all grooved, so that all liquids spilt are carried off. It measures 4ft. 10in. × 1ft. 10in. × 3ft.

Price, with drawer and lead sink (no loose fittings) .. £3 3 0
no ,, and zinc ,, (,,) .. 2 12 6

Extra.—Teak sliding rack, 3/-

274.—**Developing Sink No. 2** (Davenport & Co.)

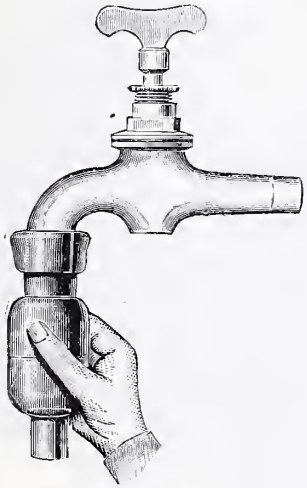
A good plain developing table at a low price. The sink is lead-lined and fitted with waste pipe. On either side are the usual benches, with a rack below for dishes, &c. These sinks are well made, and of strong, thoroughly seasoned wood. The whole varnished with the best shellac varnish, and turned out complete at the following low



No. 274.

Prices—

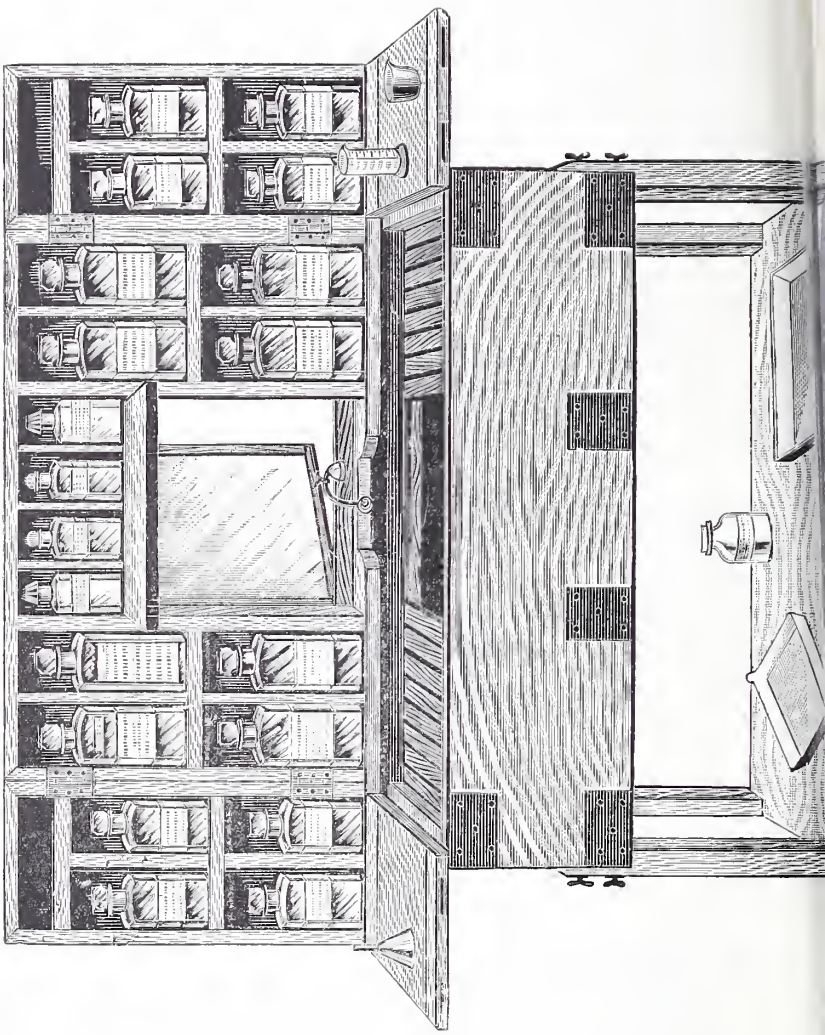
With sink,	12×10,	extreme width,	3ft...	£1	1 0
,, ,	18×12	,, ,,	3ft. 6in.	1	8 6
,, ,,	24×18	,, ,,	4ft...	1	15 6
,, ,,	30×24	,, ,,	5ft...	2	2 6



No. 275.

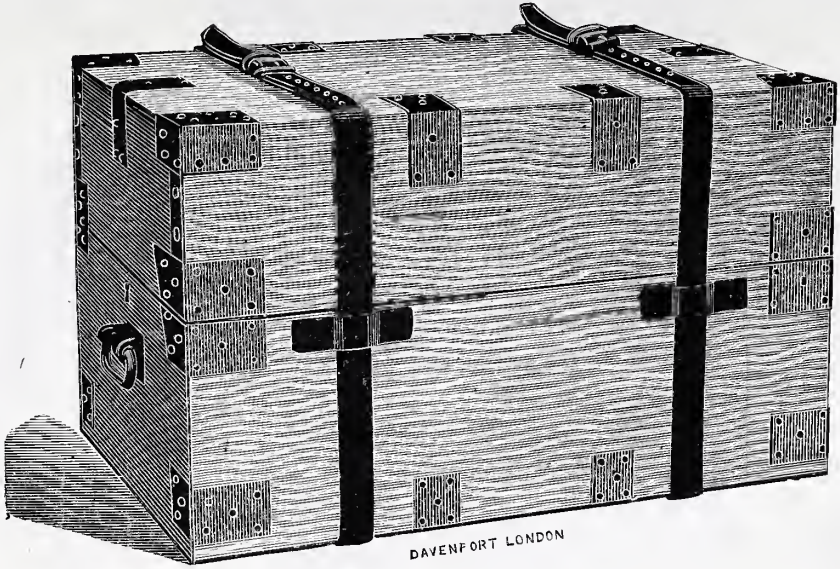
275.—**A Tap Filter** (W. Tylar).

This is an extremely handy little filter of brass, which is made, as will be seen by the illustration, to fit on to the ordinary water tap. It is the patent of Messrs. Tippetts, Limited, of Birmingham, but is being placed upon the photographic market by Mr. Tylar. At the top, where it affixes itself to the tap, is a piece of rubber let in the brass rim to ensure a tight fit. This is first wetted, and then firmly pushed on to the tap, where it remains. To remove the filter proper, the body is unscrewed from the mouth-piece, and when this is done the water can be used from the tap in



DAVENPORT LONDON

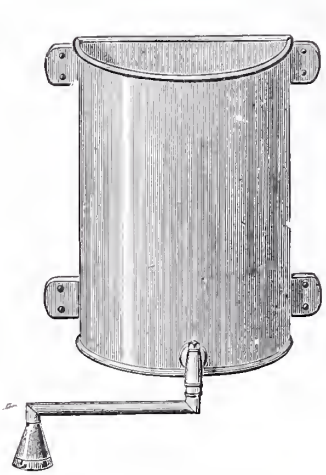
No. 272. Fig. 1.



No. 272. Fig. 2.

the ordinary way. To cleanse the filter, which is recommended, should be done once a day; it is only necessary to reverse the body after it has been removed from the mouthpiece. The opinion of an authority such as a county analyst must carry weight, and I therefore quote that of Dr. A. Bostock Hill, of the county of Warwick:—"I beg to report that I have carefully tested the tap filter received from you on the 11th inst., and find it to be most efficient in its working. It performs thoroughly all that can be expected from any tap filter, viz, the removing from the water of animal and vegetable suspended matter, so that the water, even when delivered turbid, can be made clear, bright, and much better fitted for drinking purposes. It is simple in construction, and by reversing it, it can be cleansed at once. Its simplicity and efficiency are such that I have much pleasure in testifying to its good qualities." I have carefully tested the tap myself, and certainly the appearance of the water is extremely improved, though whether the removal of animal and vegetable matter, an important item as regards drinking, is of small or great benefit to chemical solutions, I leave to others to test. But the removal of gritty particles must be a gain in development. The price is trifling, and the convenience of the method of using is so great, no one need hesitate upon that score. I notice that, as a proof of its value, it is recommended that the first glass of water taken from the back of the filter after one day's use should be examined. But the caution is added that the naked eye should be used for the experiment, and not a microscope on any account. The reason of that is pretty obvious, and if I were told that that paragraph was written by an opponent of alcohol I should not be at all surprised. The result would almost be to frighten one against "pure" plain water altogether. The bulk of household taps in England are $\frac{1}{2}$in. bore, but the following prices will meet exceptional cases:—

Prices—$\frac{1}{4}$in. bore, 1/9; $\frac{5}{8}$in., 2/3; $\frac{3}{4}$in., 2/9.



No. 276.

276.—**Dark Room Cistern** (A. H. Baird).

A galvanised iron cistern (capacity three gallons) for use in dark room, fitted with nickel-plated swing tap. Rose is removable for filling bottles, &c.

Price 10/6.

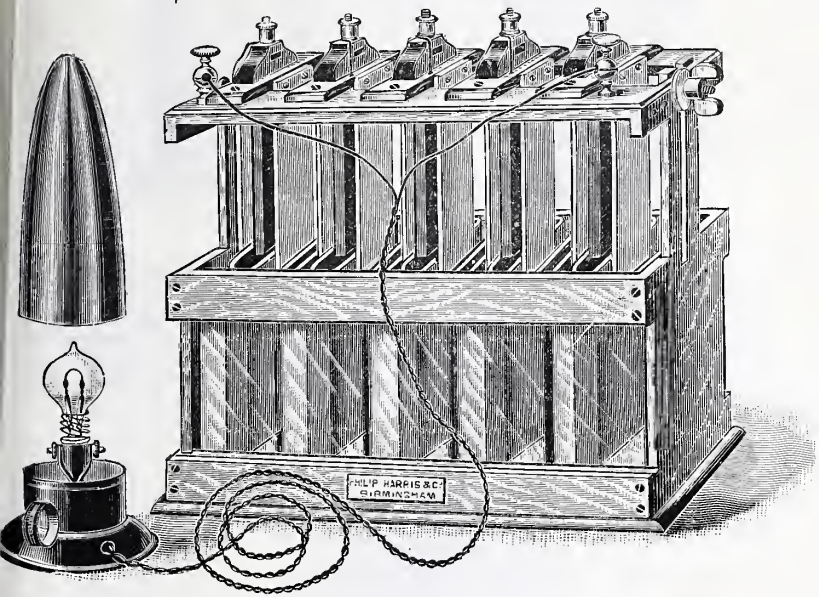


No. 277.

277.—**The "Lothian" Syphon** (A. H. Baird).

With a pail or watering can in the dark room, in conjunction with this portable syphon, one is set up with a supply of water. The reservoir of water needs to be elevated, of course, on a shelf or other erection.

Price 2/-



No. 278.

278.—**Electric Lamp** (Philip Harris & Co.)

This is a new lamp, either for the dark room or for reading purposes. The battery consists of five cells, specially constructed by the firm, with an arrangement for raising or lowering the carbons and zincs of all five cells simultaneously, and fixing them, when raised, by means of side screws to allow carbons and zincs to drain, and stop action and waste of zincs. When required for use lower the carbons and zincs by unscrewing side screw. The lamp is five-candle power, and when ruby light is required the ruby cylinder is over it. When required for lighting the cylinder is removed. Bichromate solution is to be used in the inner cells, and dilute sulphuric acid (1 in 35) in the outer cells. The framework is mahogany, polished, and the outer cells glass. Any number of cells may be used up to five, or any cell may be used separately.

Prices—

Complete with five cells	£2	5	0
Smaller, with three cells	2	0	0
Extra lamps	0	4	6
Battery, without lamp	1	19	0

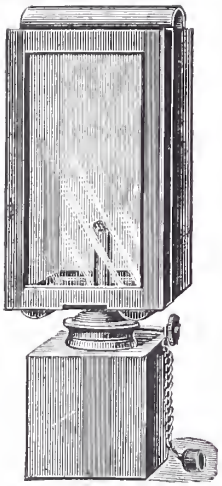


Fig. 1.

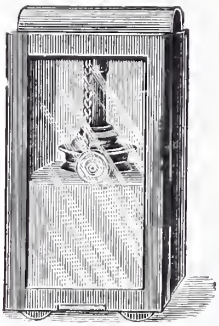


Fig. 2.

No. 279.

279.—**The Tourist's Friend** (W. Tylar).

Under this name is issued a very compact and useful little metal lamp, packing in small space. Burning spirit, each lamp holding an eight hours' supply—having a supply of extra actinic fronts in case of damage—it gives a good light, free from smoke or smell. The height of the flame can be adjusted by the winder outside the lamp, during the operation of development. For packing, the reservoir unscrews from the bottom, and goes inside the lamp body, as shown in the illustration fig. 2.

Price 3/6.



No. 280.

280.—**Candle Lamp** (J. Fallowfield).

An old pattern and one that has enjoyed very large sales, but improved and brought up to date for 1892. It can be used for night lights as well as candles.

Price 2/-

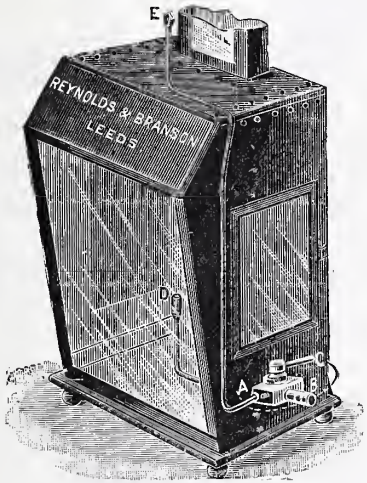


No. 281.

281.—**Bottle Lamp** (Hunter & Co.)

A neat and plain candle lamp, with deep amber glass and japanned fittings.

Price 1/3.

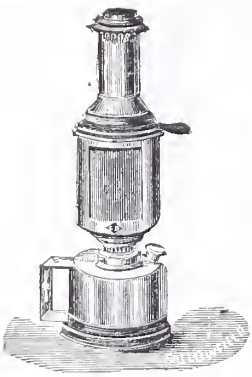


No. 282.

282.—**The Improved "Phœnix"** (Reynolds & Branson).

The improvements this year are that the partition below the outer jet E is now made double, and the panes of glass are so arranged that a cold current of air circulates between them (thus helping to keep the outer one cool), and then escapes, as may be seen in the illustration, through holes in the top. Another improvement is an opal reflector on the chimney. The front of the lamp is glazed with ruby, and both sides also have ruby glass, but either can be supplied with yellow glass, canary medium, or canary cloth, if preferred. For other details see page 524, Phot. An., 1891.

Price 15/-

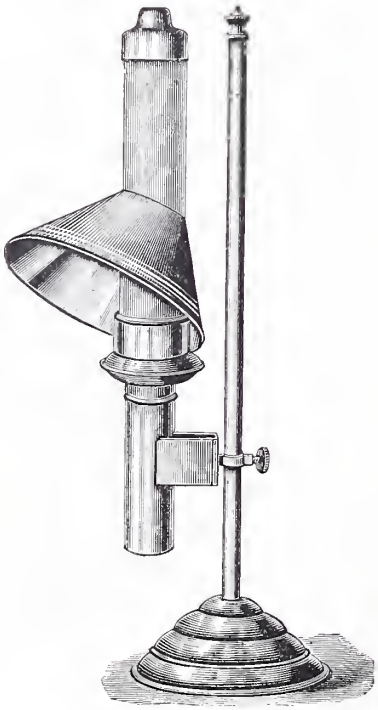


No. 283

283.—**Brass Lamp** (J. Fallowfield).

This is of very handsome appearance, and has white and ruby chimney and extra colour glasses, so that ruby, orange or white lights can be obtained at will.

Price 14/-



No. 284.

284.—**Candle Lamp** (John J. Griffin & Sons).

The features of this pattern are—(1) Screw adjustment permits of its being fixed at any height. (2) The bottom of the lamp being loaded, it is perfectly steady. (3) The inside of shade is japanned yellow, thus well illuminating the plate, but keeping all direct light from the eyes of the operator.

Price 8/6.

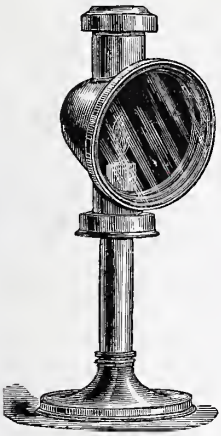
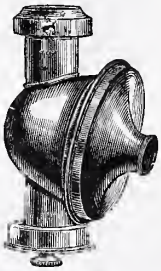


Fig. 1.



No. 285. Fig. 2.

285.—**The "Holiday" Candle Lamp.**

The makers of this lamp are Messrs. Benham and Froud, but it is to be had at all dealers, and is one of the most pleasant to use. Fig. 1 shows it ready for use, the candle being pressed upwards by the usual spring as fast as it burns. In Fig. 2 it is shown packed for transit, the base comes off and screws over the glass front, thus protecting it from injury, and the candle tube slides up into the reflector. The parabolic reflector renders the light very powerful. A white glass is supplied along with the ruby one, so that the lamp can be used for reading purposes as well. In appearance, the construction being entirely of polished brass, it is very handsome.

Price 10/6.

Extras.—Special candles, 1/- per box of six.

286.—**The "Lothian" Gas Lamp** (A. H. Baird).

A large lamp, constructed to meet the views of those who wish to use gas in the dark room. The two sides and door each have ruby and orange glass. Any or all of the panes can be removed at will, so that one can immediately have the light required. Above the sides and door a shade is placed, which keeps the light well screened from the eyes. The light is kept well down to the level of the developing tray.

Price, with gas tube attachment, 17/6.

287.—**Square Folding Lamp.**

Sold wholesale only by S. J. Levi & Co., but may be obtained from all dealers. It consists of red fabric round four light metal frames, which pack flat. When opened out square a loose bottom and top is placed on, and the lamp is ready for the night light. Simplicity itself, and very useful. The fabric portion of the lamp, when erected, is 7in. high and 3¾in. each side, and gives a good red light all round.

Price 1/-

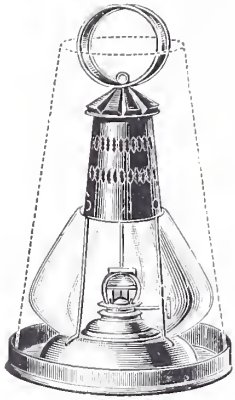


Fig. 1.

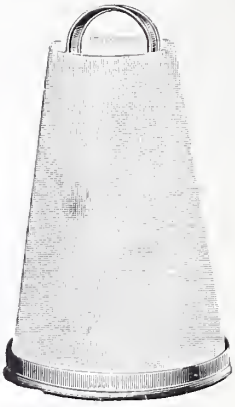


Fig. 2.

No. 288.

288.—**Combined Dark Room and House Lamp** (Birmingham Photo Co.)

A paraffin lamp arranged so that it can be used either in the household, as fig. 1, or as a dark-room lamp, fig. 2. It is fitted with yellow and ruby screens, which can be used separately or together, and it can be suspended by the ring at top, or placed flat on the table. Having no opaque sides, it gives a good and even light all over the room.

Price 6/-



No. 289.

289.—**The "Diamond" Lamp** (Hunter & Co.)

A neat candle lamp, in which Hunter's new "light filter" material is employed, giving a deep, rich orange light.

Price 5/6.

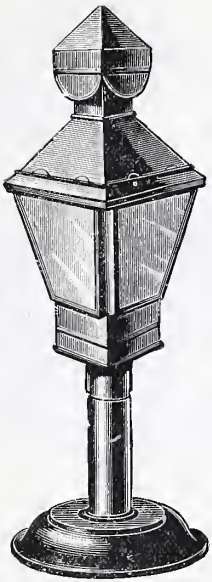
Extras—Special hard candles, 1/- per dozen.



Negative by Burgraf, Johnstown, Pa.

A SUMMER IDYL.

Autoglyphic Reproduction of Photograph by the Levytype Co., Philadelphia, U.S.A.

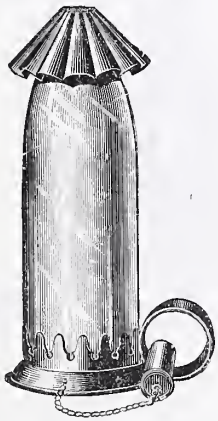


No. 290.

290.—**New Revolving Lamp** (Birmingham Photo Co.)

Four different lights direct upon the plate are obtainable, by merely revolving the top part of the lamp. These are dark and light amber, and dark and light ruby. As there are no opaque sides it illuminates the table thoroughly well, and prevents that groping about for bottles and measure glasses. The angle of the sides of the lamp causes the light to be thrown downwards on the plate or dish.

Price 8/6.

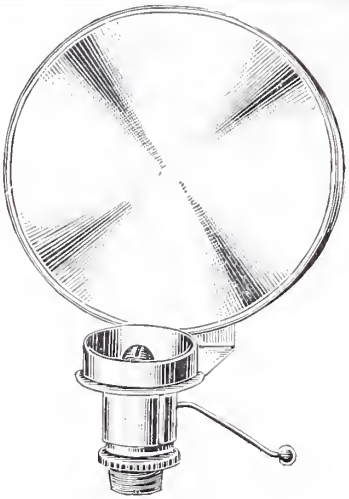


No. 291.

291—**Candle Lamp** (Birmingham Photo Co.)

An improved lamp to burn candles, with a tube for an extra one.

Price 2/3. G G

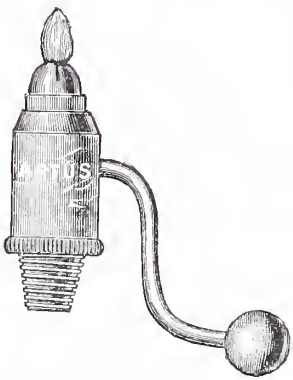


No. 292.

292.—**Self-lighting Jet with Reflector** (W. Tylar).

For contact work of all kinds by artificial light, and for lantern-slide making, a self-lighting jet is invaluable. With it the gas can be turned down to a very low blue flame, but yet not right out. By pulling the lever shown the gas is fully lit, and the reflector is in position behind it, concentrating the light right on to the negative used for printing. By its aid quicker exposures and better illumination can be got. It can be attached to any existing gas bracket, as a permanency, or otherwise. The silver-plated reflector, which is removable for cleaning.

Price 2/6.

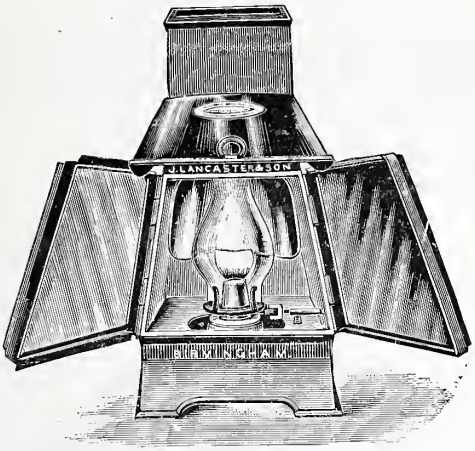


No. 293.

293.—**The "Aptus" By-pass Burner** (Sharp & Hitchmough).

This is a new pattern that will fit any gas bracket. It is a useful adjunct to the dark room for contact printing. It can, of course, be always kept lit, and by the simple movement of the lever turned on full at any time.

Price 1/-

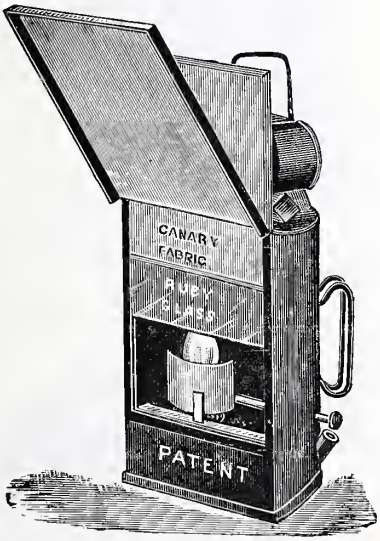


No. 294.

294.—**New "Rubralux" Lamp** (Lancaster & Son).

See Phot. An., 1891, page 525. It is considerably altered in design for the larger sizes, and is a thoroughly all-round lamp.

Prices—Oil 10/6; gas 12/6.



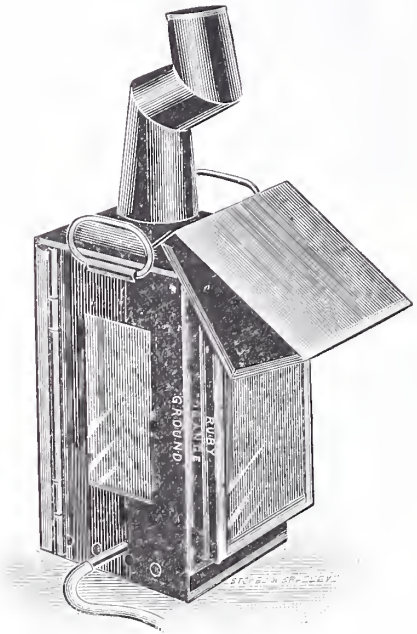
No. 295.

295.—**Lizars' Lamp** (J. Lizars).

This lamp was thought so well of by the judges at the Glasgow Exhibition that they awarded it a medal. It is certainly a capital idea. By means of a mirror in front, no direct white light passes through the ruby

glass or canary medium. The light is reflected back into the lamp by th mirror, and as the whole of the inside is painted a deep yellow, only sucl light as is reflected from the sides is utilised. The other details will b seen by a glance at the illustration. It is the safest lamp I have ye worked with. Oil is the illuminant, and the wick can be turned from the outside. It is sold at an extremely moderate

Price 8/6.

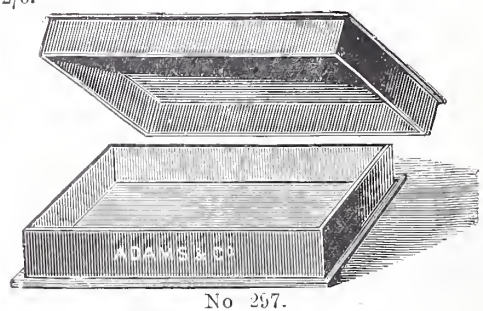


No. 296.

296.—**Gas Lamp** (W. Tylar).

A large, well-made lamp, having side windows, also ront lights of ruby, orange, and ground glass. It has a large chimney for the escape of foul air.

Price 12/6.



No 297.

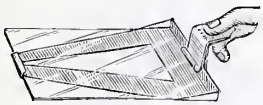
297.—**Light-tight Developing Dish** (Adams & Co.)

A dish of metal, with a covering top. Its advantages are—(1.) More light can with perfect safety to the most sensitive plate be used in the dark room. Useful for isochromatic and other very sensitive plates requiring the greatest possible protection during development, to *avoid veiled* negatives. (2.) The operator may leave or go into the dark room at will during development of most rapid plate. (3.) The slides being straight or upright, there is less tendency to spill the developer. (4.) On tour the cover or lid may be used for fixing purposes if required. (5.) Light, portable, and unbreakable

Prices—¼ pl., 1/6; ½ pl., 2/3; ¼ pl., 3/6; 12 × 10, 4/6.

298.—**The "Ownligood" Rocking Tray.**

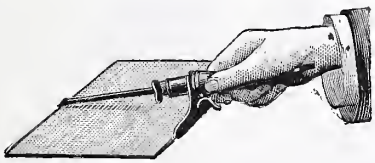
This is sold wholesale only by S. J. Levi & Co., and may be obtained from all dealers. It is a new dish for developing, made in porcelain and different coloured Xylonite, to which by means of a half marble shape knob fixed underneath the centre of the dish, a rocking motion is easily procured, and in any direction. When it is required to leave dish by itself for a time, it can be placed on a graduated measure, or anything else handy, so as developer shall lie evenly on the plate. In the case of large size dishes, a suitable piece of wood is supplied free with same.



No. 299.

299.—**Plate Lifter** (J. J. Griffin & Son).

A metal frame for lifting plates out of solutions.
Prices—¼ plate, 6d.; ½ plate, 9d.; ¼ plate, 1/-



No. 300.

300.—**The "Jones" Plate Lifter** (Houghton & Sons).

The features of this new lifter are that one hand only is necessary in manipulating. No part of it comes in direct contact with film, neither does it prevent the developer acting on every part of the film. Inspection of the negative during development and preliminary washing are considerably facilitated. Each size lifter can be used for many sizes of plates, the adjustment being effected in a second; and when adjusted by means of thumbscrew to any given size, it will remain so until readjusted.

Prices—Adjustable, plates 3¼ to 6½ inch width, 5/-; plates 3¼ to 10in. width, 6/6; fixed, ¼ plate, 2/6; ½ plate, 3/-

301.—**Celluloid Well Trays** (J. R. Gotz).

These are very light transparent trays of celluloid, coloured or rich orange. With all light trays the tendency is towards easier spilling of the solution, but in these a projecting piece across one end allows of pretty violent movement without making a mess. The cross piece acts as a well and enables the tray to be held up to the light so that the density of the plate may be seen without removing it from the dish at all. In the 7½ × 5

size I tried, six ounces of developer were securely kept in by the well, allowing every part of the plate to be seen ; but two ounces is sufficient. I have seen nothing better in the way of developing trays.

Prices—1/6 and 2/6.

302.—**Combined Developing Dish, Rocker and Screen** (C. C. VEVERS).

This might be termed a developing *multum-in-parvo*, for it combines in itself an ordinary developing tray, capable of being rocked, and covered over with a screen. It consists of a light frame on rockers, upon which the developing dish rests. At one side is hinged (the hinges being adjustable to allow for the depth of the dish) a japanned tin screen or lid, which closes down over the dish, thus protecting the contents from extraneous light. This screen can be raised for the examination of the negatives; while the developer can be kept in constant motion by a gentle touch of the rocking frame every few minutes.

Prices—	¼ pl.	½ pl.	¼ pl.
Combined rocker and screen	1/9	2/6	3/6
Ditto, complete with celluloid dish ..	2/4	3/6	5/-
Ditto ditto shallow porcelain ..	2/3	3/2	4/5

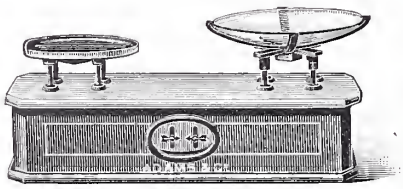


No. 303.

303.—**Hypo Jar** (ADAMS & Co.)

This is a stoneware, glazed inside and out, with ground stopper and fastener. It is a very useful thing for storing hypo in small quantities, and keeps the chemical fresh and clean.

Prices—To hold 7lbs. 2/6; 14lbs. 3/6

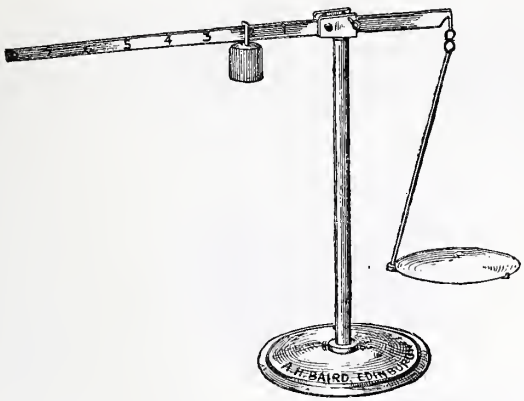


No. 304.

304.—**The "Club" Scales** (ADAMS & Co.)

These are best quality scales, solid marble top, 6in. glass pan (with an extra one for special purposes or in case of accident), and each scale is Government stamped. They are suitable for the very finest work.

Price £3 3s.



No. 305.

305.—**The "Lothian" Balance** (A. H. Baird).

A cheap and yet reliable balance for chemicals, &c. In use the beam is to be held in the left hand between finger and thumb, and with the right hand the substance to be weighed is put on the pan. The beam is then swung with the left hand, and when equally poised the desired weight is arrived at.

Price 5/-

WASHING APPARATUS, RACKS, &c.

The following were noticed in the "Photographer's Indispensable Handbook —

Effective ...	...Bleasdale	Cheap	...Marion	Print	...Newton
Combined ...	...Houghton	Print	...Mason	Folding Plate	.Shew
Combination ...	...Marion	Fixing Trough	... ,,	Sturrock's ...	...Watson
Zinc	... ,,	Godstone ...	Maynard	Folding Rack	...Tylar
Registered ...	... ,,	McGhie's ...	...McGhie	Rigid Rack ...	... ,,
Porcelain ...	... ,,	Newton's	.. Newton	Draining Rack	...Houghton

The following were described in "Photography Annual," 1891 :—

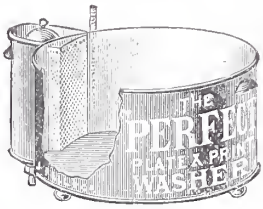
Washers.			Wood's ...	...Wood
	Hiero... ...	...Lancaster	Washing Racks.	
	Optimus ...	.. P. S. and R.		
Aquapoise ...	Plate and Print	.. Marion		
Club	Porcelain ...	.. Fallowfield	Facile ...	...Birm. P. Co.
Current Producer	Simplex ...	Rooke	Folding ...	...Vevers
Excelsior ...	Sutcliffe's ...	...	Negative ...	...Sutcliffe
Facile ...	Whirlpool ...	...Tylar	Portable ...	...Hinton

306.—**Firth's Double Syphon Washer** (Marion & Co.)

There are many who prefer to soak their prints and drain off the water alternately, rather than use the washing tanks, which need constant and perfect motion of the prints to work properly, and sometimes a strong jet of water as well. The above washer is an automatic method of first soaking and then draining. Two tanks are employed, the one fitting into the other, and fitted with syphons. The prints are placed one upon the other in loose perforated trays, one upon the other in a cage. The upper tank is then placed on the lower one, and water allowed to run in in a thin stream. When the water reaches the bend of the syphon it is discharged into the lower tank covering the trays, but not reaching the top of the lower syphon. During the time the upper tank is filling again the prints

in the tray are soaking, and this lasts for seven or eight minutes. At the next discharge of the upper tank it raises the water in the lower one sufficiently to bring the syphon into play. In this way the water is drained off the prints; they remain draining until the upper tank again discharges. It is ingenious and effective.

Price 15/-

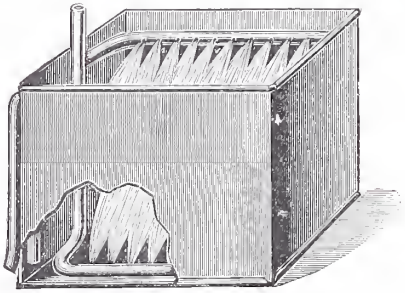


No. 307.

307.—**Jefferies Washer** (Fell & Co.)

This has been altered and improved by fixing a double gauze, as shown in the illustration.

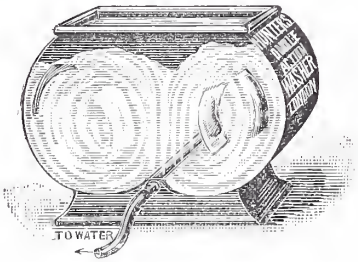
Prices—½ pl., 12/-; ¼ pl., 17/-



No. 308.

308.—**Combined Tank and Print Washer** (W. Tylar).

This is very strongly made in sheet zinc, and will accommodate any plate rack up to half-plate size, or a considerable number of prints as preferred. The water is forced through perforated leaden pipes in fine streams, one pipe running at the top, and another at the bottom edge of the tank. A syphon attached automatically empties the tank when the water reaches a given height.

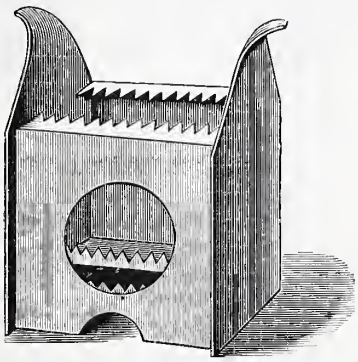


No. 309.

309.—**"Double Action Washer"** (HUNTER & Co.)

Having thoroughly tried this washer, it really does seem to me to carry out the points claimed for it, viz., constant motion of the prints, and therefore the most complete elimination of hypo. The illustration conveys a fairly good idea of the construction and action. The front view presents the appearance of two overlapping circles, and, at the point where they meet, a bar of peculiar construction is carried across, from which the sprays emerge vertically in the centre of the washer. The result of this arrangement is that the prints are driven upwards and away from the sides of the vessel, and are carried round right and left by the currents formed by the force of the spray. The action of the washer is therefore automatic. Provision is made for keeping the two currents independent; and if one side becomes too much crowded with prints a portion passes over to the other. The overflow is constant, and is drawn from a well under the perforated bottom. It is strongly made in zinc, with moulding round top and bottom, and japanned throughout.

Prices—12in., 12/6; 15in., 17/6.; 18in., 25/-

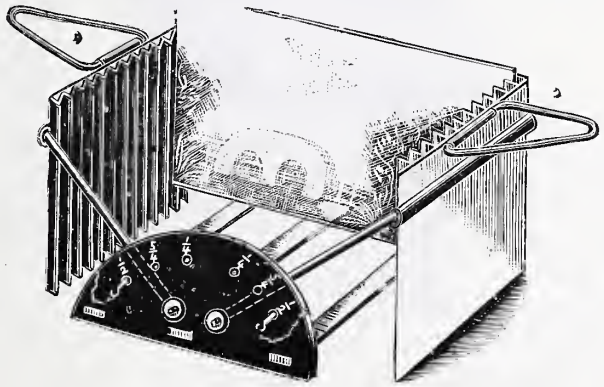


No 310.

310.—**Washing Rack** (J. J. GRIFFIN & SONS).

A strong iron rack for washing or drying plates that can be used any where. The prices are very low, and it should be a most attractive rack.

Prices—	¼ pl.	5 × 4	½ pl.	¼ pl.
	1/3	1/4	1/6	1/10



No. 311.

311.—**Expanding Rack for Plates** (W. Tylar).

This is a machine-made rack of polished white metal, unaffected by water. The construction is seen by the illustration. The racks are hung pendant on two strong wires, pivoted near the centre of two semi-circular base plates. These racks can be moved to accommodate the varying widths of a $\frac{1}{4}$, 5 × 4, or $\frac{1}{2}$-plate, and are kept firmly into position by small pegs (attached to the rack by brass chains) dropping into holes placed at the proper distances apart to receive them.

THE PRINTING ROOM.

The following appeared in the "Photographer's Indispensable Handbook".—

FRAMES.

Adcock's Vignetting
Cowen's Opal
Durnford's
Metal
Ordinary
Vignetting

RETOUCHING DESKS.

Amateur
Coles's
Houghton's
Mason s

Stanley's Cutting Table
Newton's Print Cutter
Cowen's Cutting Boards
Wratten's Revolving Table
Perry's Cloud Negatives
" Vignettes
Stephanie Vignettes
Mason's Zinc Vignettes

The following were described in "Photography Annual," 1891:—

PRINTING FRAMES.

Full View ... .. Birm. P. Co.
Improved ... ...Tylar
Indicator ... ... ,,
Opal... . .. Prestwich
Stereo Trans. ...Chadwick
Strut and Hanger.. Birm. P. Co.
Triple Pressure .. Lancaster

RETOUCHING DESKS.

Amateur ... .. Lancaster
Cheap ... ...Vevers
Perfect ... ...Marion

PRINTING ROOM (Various).

Barry's Printing Meter Tylar
Fuming Box ... ...Hunter
Nameit ... ...Gray
Sen. Paper Box .. Vevers
Varnish Pot ... ...Wright

PRINT TRIMMERS.

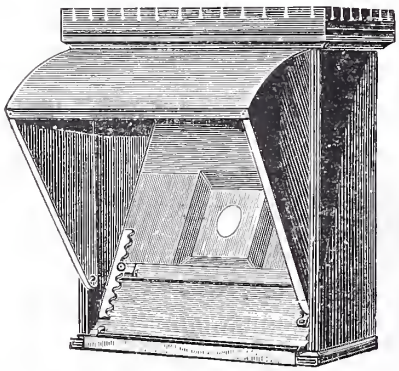
Cutting Glasses .. Tylar
Cutting Machine ...Sharp
Hunter's ... .
Hunter's Swivel ...
Parallel ... ...Baker
Pneumatic Handle Tylar
Revolving Table ... ,,
Swivel Cutter ... ... ,,
Turntable ... .. Lund

VIGNETTES.

Celluloid ... ...Tylar
Clips ... ... ,,
Golden ... Birm. P. Co
Goodall's Serrator Marion
Metal ... ...Tylar
Norser ... .. Marion
Premier Waxed .. Lund
Serrated ... .. Hunter
Whyte's Frame ...Marion
Whyte's ... ... ,,

MASKS & BORDER NEGATIVES

Art Masks... ...Adams
Border Negatives ,,
Cloud Negatives Lund
Fancy Masks ...Tylar
Marginals ... ...Vevers



No. 312.

312.—**The "Common Sense" Desk** (McGhie & Co.)

A very useful, and, at the same time, ornamental retouching desk. It is suitable for any size negative under 30 by 25, and has a false top which can be pulled down to darken the space in front of the glass cut-out. The bed on which the negative is laid can be set at any inclination. By means of the slide rest, the negative may be moved up or down to any desired position. They are made in two sizes, No. 1, as in the illustration, and No. 2 on a stand with castors for floor and a drawer.

Prices—No. 1, 45/-; No. 2, 70/-

313.—**Cheap Retouching Desk** (Griffiths & Co.)

A desk that will certainly meet the wishes of those who need one occasionally only, and to whom the expense is a deterrent factor. It is of cloth or imitation leather covered wood, measuring outside when closed 42½ inches square and 2 inches in depth. It has the usual covering top and sides, supported by struts. The working part measures 12 inches square, so that any size negative up to 12 × 10 could be dealt with comfortably. The under part is also supported by struts, and the mirror is of neat design, hinged to the middle or working portion, and can be placed at any angle. Altogether the desk is a wonderful production at the

Price—7/6.



No. 314.

314.—**Negative Holder** (C. C. Vevers).

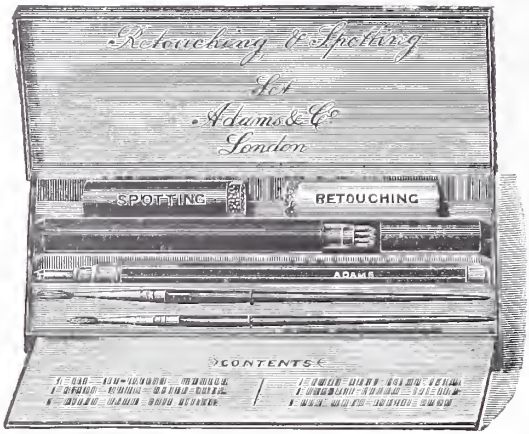
An ingenious clip made of brass with ebonite ends, for holding negatives when varnishing, &c.

Price 1/6.

315.—**Green's Carbon Cloud Negatives** (W. Green).

From the samples I have seen these appear a most beautiful series. They are permanent and structureless, a result hitherto unattainable except in glass negatives, which are heavy, fragile, and difficult to store. The new films are transparent and print very quickly, and can be used from either side to suit the lighting of view; they are not easily damaged, and can be preserved between the leaves of a book. The clouds themselves are photographed in one of the most favourable districts in England, noted for the special beauty of its cloud effects, whilst their artistic value is enhanced by retaining all the distant horizon clouds. The price, though of necessity higher than many paper negatives, is still reasonable when the nature of these negatives and their indestructible character is remembered.

Prices—½ pl., 2/-; ¼ pl., 3/6; 12 × 10, 5/6; 15 × 12, 7/6.

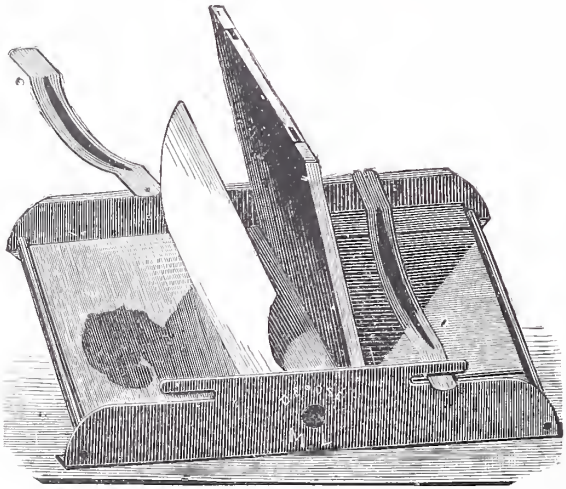


No. 316.

316.—**Retouching and Spotting Set** (Adams & Co.)

A case containing all the necessary things for retouching and spotting out. The contents are :—One retouching pencil, one box refill leads (three grades), one spotting medium, one bottle retouching medium, one small spotting brush, and one large ditto. All fitted complete in a neat small covered case.

Price 2/-



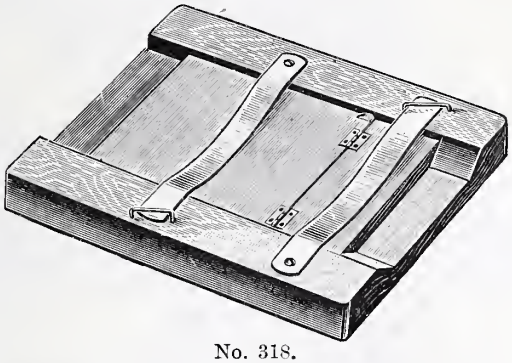
No. 317.

317.—**The "Daisy" Printing Frame** (Shew & Co.)

A very neatly constructed frame of metal, with a wood back, reaches me this month. One feature is that of lightness, the half-plate size weighing only 7½ozs. Being so neatly designed, it, of course, takes up much less room than the ordinary patterns, and being of metal is not so liable to the

effects of damp. One other good feature is the back, which, in addition to opening at a third of the length (viz., exposing two-thirds of the print to view), has a really effective brass hinge let into the wood and running across the whole width. The ordinary two small hinges very quickly break off. Altogether the "Daisy" is a good thing, and should meet with success, especially amongst amateurs. In my hands printing is a comfort when using it.

Prices—¼ pl., 1/3; ½ pl., 1/8; 1/1 pl., 2/9.

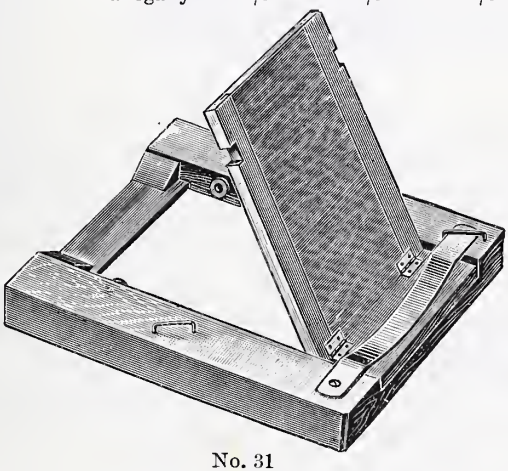


No. 318.

318.—**The "Safety" Frame** (Birmingham Photo Co.)

In this frame special provision is made to prevent the slipping out or falling through of the negative, and movement of the print is also obviated. It can be had either with the back unequally divided, as shown in the illustration, or divided in the centre.

	¼ pl.	½ pl.	1/1 pl.
Prices—Teak ..	8d.	1/1	1/9
Mahogany	1/3	1/9	2/6



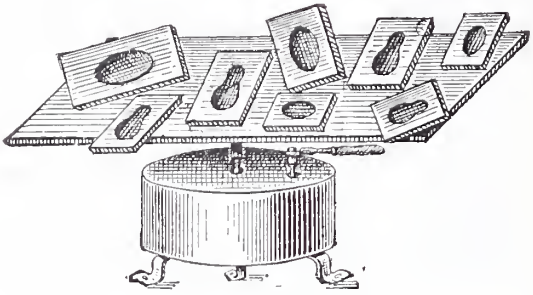
No. 31

319.—**The "Full View" Frame** (Birmingham Photo Co.)

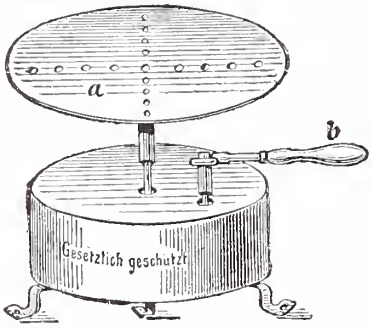
As with No. 613, page 551, Phot. An., 1891, the whole of the print can be examined at once, and the frame is so constructed as to allow of the adjustment of the negative so that *any part* may be printed from when a full-sized print is not required. At the same time the rubber rollers hold the negative

safely in the frame and keep it from slipping. Another feature in the frame is an ingenious arrangement for making the back immovable, thus preventing double impressions, caused by the slipping of the back.

	¼ pl.	½ pl.	¼ pl.
Prices—Teak ..	11d.	1/8	2/8
Mahogany	1/4	2/-	3/-



No. 320. Fig. 1.



No. 320. Fig. 2.

320.—**Revolving Vignetting Table** (Houghton & Son).

There can be no question that constant moving of the frame in producing vignettes is the surest way to give soft and pleasing results. But this is troublesome, assistants neglect it, and if any of the outside vignetting systems are used, considerable care has to be taken to avoid shifting the position. The above apparatus does the work by a slow revolving motion, and very smoothly. It is screwed down to the bench or table, and a board large enough to hold about a dozen printing frames placed on top as shown in fig. 1. The winding up is accomplished by moving the handle B in fig. 1 to and fro. When fully wound up, it will work 1½ hours without further attention. It will prove a great boon to those desirous of getting soft vignettes.

Prices.—Carrying capacity 70lbs. £2 0 0
,, ,, 175lbs. 4 10 0

321.—**Vignette Clips** (Photo Enterprise Co.)

A small screw-down clip of brass to keep the vignette paper or card in position upon the frame during printing.

Price 4d. each.

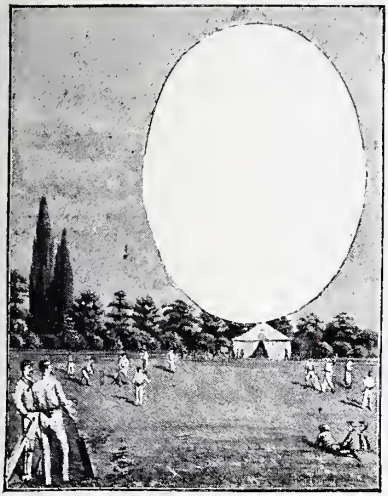


Fig. 1.



No. 322. Fig. 2.

322.—**Border Negatives** (Adams & Co.)

It is often recommended to the professional in his dull season that he should try a novelty or two in his window or show case to draw in the public. One of the most effective and attractive of these is the use of border negatives, pretty and artistic designs, into which are printed portraits.



Fig. 3.

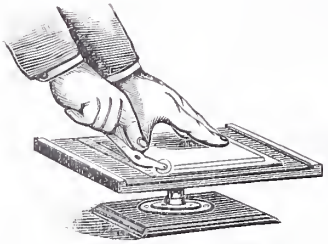


No. 322. Fig. 4.

A new series has just been placed upon the market by the above firm, many of which are decidedly good. I have had the pleasure of seeing the original artist's sketches, and can assure readers that they are thoroughly

well done. Not only are these borders useful to professionals, but they form a pleasing variety to the amateur's album, and ought to make excellent Christmas cards and birthday *souvenirs*. They are issued as negatives, either on glass or good thick celluloid, at prices which are very reasonable indeed. The sizes range from carte and ¼ plate to ½ plate.

Prices—	C.D.V.	¼ pl.	Cabt.	½ pl.	¼ pl.
On glass ..	1/3	1/3	2/-	2/-	3/- each.
On celluloid ..	1/6	1/6	2/6	2/6	3/6 ,,

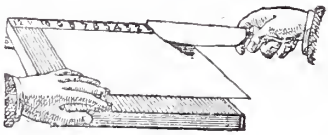


No. 323.

323.—**Revolving Cutting Table** (Hunter & Co.)

This is not new, except in the way of price. But a well-made article, working properly, at a moderate cost, has not before been placed before the photographic public. It consists of a well-fitted metal turn-table, mounted on a wood base, having a top faced with glass.

Prices—Up to 10 × 8, 5/6; larger, 6/6 and 7/6.

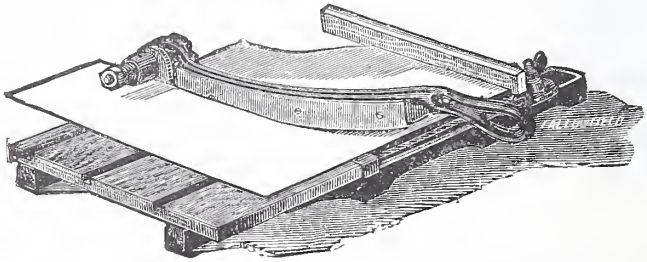


No. 324.

324.—**The "Aptus" Amateur Cutter** (Sharp & Hitchmough).

For the use of amateurs perhaps particularly, the firm have introduced a lighter make of machine for the purpose of trimming prints, &c., cutting sensitised paper into sizes, leaving the edges perfectly clean and ready for mounting. This machine will trim prints up to 10 × 8 with a single cut of the knife. It is fitted with a rule gauge, answering the purpose of squaring and measuring the print at the same time. The size of the cutting table is 12in. × 12in.

Price 21/-

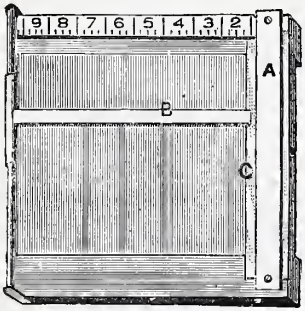


No. 325.

325.—**Card and Ferrotype Cutter** (J. Fallowfield).

Machines of this class as a rule will only cut the length of the knife blade, but this one is guaranteed to cut any size sheet of paper, card, or ferrotype.

Price £1 17*s.* 6d.



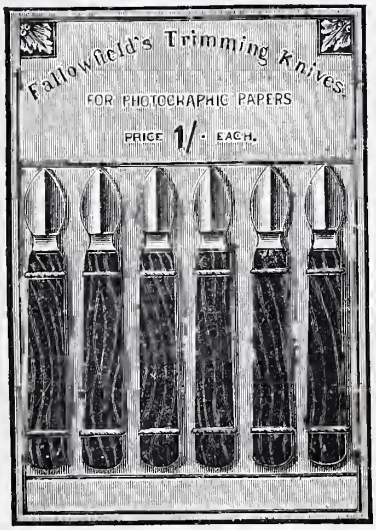
No. 326.

326.—**Parallel Trimmer** (Adams & Co.)

An apparatus for trimming paper and prints to any desired size, and enabling the user to be sure that they will be true and square. With this the sides may be cut strictly parallel to the vertical lines. The base upon which the cutting is done is glass.

Prices—8½ × 6½, 8/-; 12 × 10, 10/6



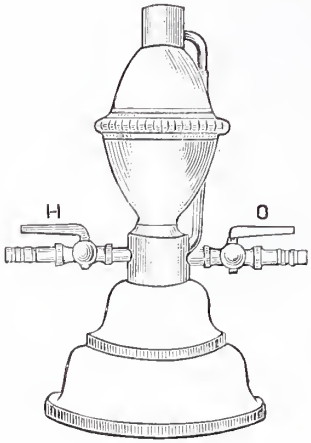


No. 327.

327.—**Cutting Knives** (J. Fallowfield).

The illustration in this case is almost sufficient. The knives are best quality and of English manufacture, Sheffield to boot.

Price 1/-



No. 328.

328.—**Oxy-hydro Magnesium Lamp** (Platinotype Co.)

This is the lamp shown by Mr. Humphery at the Camera Club Conference. Although perhaps primarily intended for printing by artificial light, and as such is here classed, it is also a very good apparatus for photography at night or in dark places. The shape of the lamp will be seen by the above illustration. It is mounted on a very heavy base to insure steadiness. H is a pipe governed hy a stop cock, and to this is attached a rubber tube from a gas bracket. O is a corresponding tube attached in a similar way to a compressed oxygen gas cylinder. The magnesium powder lies in the bottom of the lamp. The hydrogen tap is first turned on very gently, so as to avoid disturbance of the magnesium powder, and lighted at the top. Next the oxygen tap is turned, and the appearance given is that of the oxy-hydrogen blow pipe. The oxygen, after passing the tap, divides into two portions, one portion going up the tube in the interior, and the other outside as shown above. The coal gas is therefore completely surrounded by oxygen, and complete combustion is secure. The pressure of hydrogen is increased at the tap H by its being turned on full, and this pressure not only increases the size of the flame hut carries up with it the powder. In this way a very powerful and continuous light is obtained. It is so powerful in fact that Mr. Humphery was able at the conference to produce a fully exposed platinotype print, with an exposure of 10 seconds. For use as a flash lamp, a tube can be added to the hydrogen supply pipe actuated by a ball, pressure upon which would drive the magnesium through the flame in the ordinary way. A good deal has been made of the fact that the idea is old, magnesium burnt in oxygen being accomplished years ago. But the fact remains that Mr. Humphery has so improved matters that what before was an uncertain and troublesome apparatus is now simple enough to become of commercial value, which is more than can be said of the original idea.

Price £2 2*s*.

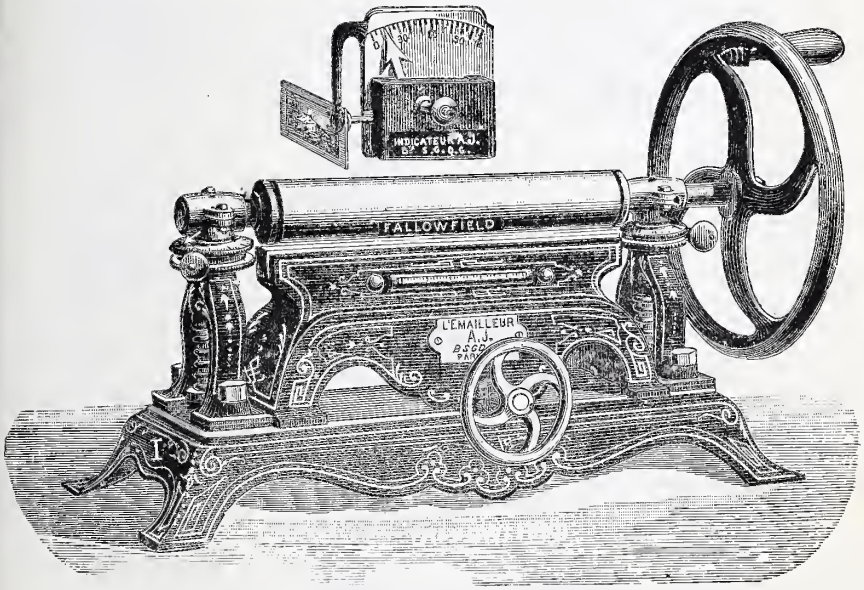
BURNISHERS AND ROLLERS.

The following appeared in the "Photographer's Indispensable Handbook":—

Adjustable Hot	McDonald's	Stuart's
Bowman's	Newton's	Watson's
Central Pressure	Optimus	Western Rotary
Fallowfield's	Robinson's	Windsor
Gem	Self-adjustable	
Knox's	Self-adjusting	

The following were described in "Photography Annual," 1891:—

Acme ... ...Eastman	Oscillating... ...Fallowfield	Standard ... ... Sutcliffe
Challenge ... ...Adams	Quadruplex ... ——	Star ... ... Adams
Champion Cheap ...Fallowfield	Rotary ... ...Fallowfield	Sutcliffe's New ... — -
Cheap ... ...Tylar	Speciality ... ...Sutcliffe	Vevers's ... ... — -
Fernande ... ...Rudousky		

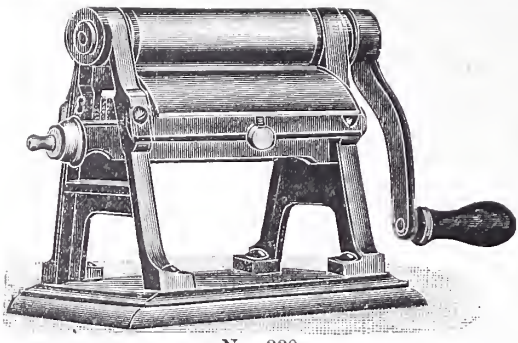


No. 329.

329.—**The "A.J." Burnisher** (Fallowfield & Marion).

The features of this new apparatus are as follows:—An indicator for gauging thickness of mount, and corresponding graduated adjustments at each end of roller. This is shown in the illustration above the top cover. An oscillating roller with pressure derived from coiled springs. The burnishing bar may be racked away from the roller by means of the wheel in front. It is fitted with a thermometer, so that the heat may be regulated to a nicety.

Prices—6in., £4 9s.; 8in., £5 12s.; 10in., £7 8s. 6d.; 12in, £8 12s. 6d.; 16in, £11 10s.; 20in., £13 7s.; 24in., £15.

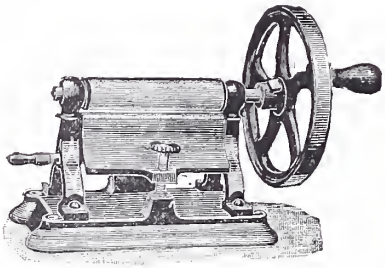


No. 330.

330.—**The "A1" Burnisher.**—(W. Tylar).

A good substantial instrument, sure to find favour with professionals. It is of best make throughout, all the bearings well fitted, a large roller, and plenty of space underneath the adjustable table for manipulating the Bunsen burner or lamp used for heating purposes. The burnishing bar is of hard chilled steel, and has a central adjusting screw. It will be issued with nickel-plated roll and nickel-plate bars and beds.

Price—6½ inch, 21/-

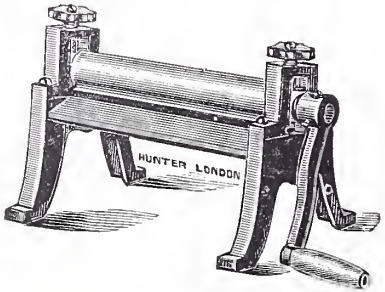


No. 331.

331.—**The "Northern" Burnisher** (Lonsdale Bros.)

A good, plain, substantial, and cheap burnisher, supplied with spirit lamp and smokeless burner for gas. It is made in two qualities, No. 1 black japanned, and No. 2 nickel-plated and japanned black and gold.

Prices—Smallest size No. 1, 10/6; ditto No. 2, 17/6.



No. 332.

332.—**Hunter's Burnisher** (Hunter & Co.)

A good reliable piece of work, at a very moderate cost. Simple in construction, easy to clean and keep clean, and yet capable of best work. Roller adjustment rocking bar, and also bar frame adjustment. The A series are, as the prices show, the best, and they are all fitted with either gas heater or spirit lamp.

Prices—

Class A.	Class B.	Class C.
6in., —	—	10/6
7in., 21/-	15/-	12/6
9in., 30/-	20/-	16/6
11in., 40/-	30/-	21/-
15in., 60/-	50/-	30/-

PRINTS, MOUNTS, AND MOUNTING.

The following were described in the "Photographer's Indispensable Handhook":—

Gelatine Mounting Apparatus | Hooper's Fancy Mounts | Newton's Squeegee.

The following were described in "Photography Annual," 1891:—

Print Apparatus.
Duplex Squeegee...Hunter
Hanger ... ...Tylar
Roller Squeegee ...Sharp
" " ...Tylar

Mounts and Mounting.
Artist Mount ...Mason
Art Tissues ...Lund
Autos Mount ... "
Blotting Books ...Wheeler
Card Press... ...Tylar
Enamel Metal Plates ... ...Fallowfield
Gainsboro'Mount ..Hannam
Motto Mounts ...Adams
" ...Fallowfield
Mounting Apparatus ... ...Fell
Mounting Apparatus ... ...Tylar
Ornamented Back Mounts ...Fallowfield
Plate Mounts ... "
Pulp Slabs... ...Tylar
Whatman Sunk Mount... ...Hannam



No. 333.

333.—**Paper Hanger.** (Photo Enterprise Co.)

A convenient and neat little clip for suspending paper, celluloid films, &c, to dry.

Price 3d. per dozen.

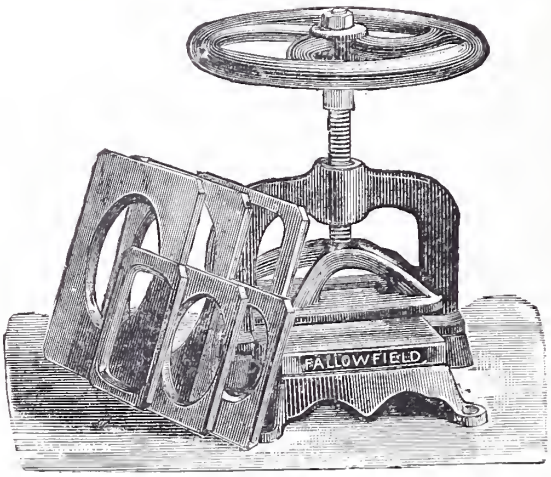
334.—**Print Cases** (Geo. Wheeler & Co.)

Most of us carry a few pet prints about with us, at all events most hand-camera men do, and so do beginners proud of their results But what dirty bits of paper and old envelopes are usually utilised for the purpose. These light neat cases are made to enable the photographer to carry a selection of his work in a portable form, and protect the prints from damage. Each contains one dozen leaves of stout, smooth, non-injurious paper, covered with cloth, and secured by an elastic band. The word "Prints" is stamped in gold on the outside.

Prices—¼ plate, 6d.; 5 × 4, 9d.; ½ plate, 1/-

335.—**Card Frames** (Marion & Co.)

These are made of cardboard, with elegant designs, mottoes, floral decorations, and other ornaments printed on. A photograph or a drawing can be slipped into the front, making a charming little Christmas or birthday present. Each mount has a stout back, and thus serves the purpose of a frame. Local views look very well in them. The mottoes and designs are suitable for all seasons as well as Christmas. The prices vary according to size and quality from 1/4 per dozen to 8/- The latest design, and the only one that I need refer to, represents a hansom cab, the outside bearing the words, "Where's the Fare?" the doors and window open with a spring showing the portrait inside.



No. 336.

336.—**Cameo Press** (J. Fallowfield).

A new, extra massive, and strong press for cameo work, finished in nickel. Although this style is somewhat out of fashion just now, the fact of a new press being introduced is a proof that there is some demand for it. And with the fluctuations of fashion, even in things photographic, no one can say the public may not at some future time go the whole hog for what they term "cameo portraiture."

Prices—C.D.V. with three dies, 12/-; cabinets with six dies, 25/-

337.—**Silver Grey Mounts** (Marion & Co.)

These are made expressly for platinotype and bromide prints, and are of the most effective grey tint. They can be had with either plain, termed "blind bevel," or gilt edges.

	Blind Bevel per 100	Gilt Bevel per 100
Carte	2/9	3/7
¼ plate	4/4	5/4
5 × 4	5/6	7/4
Cabinet	5/6	7/-
½ plate	7/6	9/6
1 „	15/6	20/-

338.—**Silver Grey Plate Mounts** (Marion & Co.)

These are the same as No. 337, but have an India tint laid on, a plate mark impress, and good bevel edges.

	Per dozen	Per 100
¼ plate	2/4	13/4
½ ,, ...	3/-	21/4
1 ,, ...	4/8	34/-
10 × 8	8/8	64/-
12 × 10	12/-	90/8





No. 339.

339.—**"Vista" Mounts** (Lund & Co.)

There can be no question as to the sale of these as soon as placed on the market. The mount consists of a piece of ornamental paper cut to the necessary size, and pierced with an opening of suitable size, a piece of cardboard for a back, and a ring and tag for suspending the picture. The glass is supplied by the photographer himself, from his stock of spoiled negatives. They are put up in boxes as follows, C.D.V. 20, cabinet 12, and whole-plate 6, all at one

Price 1/-

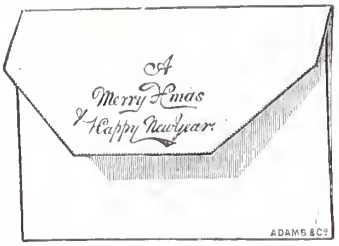
340.—**Fallowfield's 1892 Plate Mounts** (J. Fallowfield).

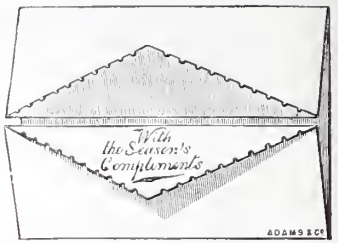
These are now thicker in substance and superior in quality, the surface is a rough one, and the tint is pasted down. They are made in several varieties as follows:—

(A) White board with cream tint.
(B) White ,, grey ,,
(C) Cream ,, grey ,,
(D) Grey ,, cream ,,
(E) Grey ,, light grey ,,

Prices—

Thickness.	Size of Board.	Size of Tint.	Doz.	100.
5 Sheet	8 × 6 ..	5½ × 3¾ ..	1/- ..	7/6
5 ,,	8½ × 6½ ..	5 × 4 ..	1/2 ..	8/-
5 ,,	8½ × 6½ ..	6 × 4¼ ..	1/2 ..	8/-
5 ,,	9½ × 8 ..	6½ × 5¼ ..	1/6 ..	10/-
5 ,,	10 × 8 ..	7 × 5 ..	1/8 ..	11/6
5 ,,	10 × 8 ..	7½ × 5½ ..	1/8 ..	11/6
6 ,,	12 × 9 ..	8 × 6 ..	2/- ..	15/-
6 ,,	12 × 10 ..	8½ × 6½ ..	2/3 ..	16/-
6 ,,	12 × 10 ..	9 × 7 ..	2/6 ..	18/-
6 ,,	12 × 10 ..	9½ × 7½ ..	2/6 ..	18/-
6 ,,	14 × 11½ ..	10 × 8 ..	3/3 ..	23/-
8 ,,	15 × 12 ..	10½ × 8¼ ..	4/- ..	27/6
8 ,,	18 × 14 ..	12 × 10 ..	4/6 ..	35/-
8 ,,	20 × 16 ..	14 × 11 ..	6/3 ..	50/-
8 ,,	21½ × 17½ ..	15 × 12 ..	7/6 ..	55/-
8 ,,	25 × 19 ..	18 × 14 ..	8/6 ..	65/-





No 341.

341.—**Christmas and New Year Mounts** (Adams & Co.)

These are a very pretty and artistic series, and quite new. The tints are very delicate, as becomes them for the special purpose. The cards are what is known as "Duplex," that is, the outside is a different tint to the inside. The wording (shown in illustrations) is blocked in gold. They make extremely handsome Christmas and New Year cards, with a suitable photo mounted inside.

Prices—¼ pl. 3d. each, 2/6 doz.; ½ pl. 4d. each, 3/6 doz.

342.—**Platinotype Mounts** (J. Fallowfield).

A new series for 1892, suitable for bromide and platinotype prints. They are made out of ivory-surface hard grey boards, with board same substance, lighter grey pasted on with bevel edges (as tint), and white, hand-drawn line round.

Prices—

	Size of Board.	Size of Tint.	Doz.	100.
C.D.V.	6 × 4½	3¾ × 2½	2/-	14/-
Cabinet	8½ × 6½	6½ × 4⅜	3/-	22/6
Boudoir	10 × 8	7½ × 5	4/6	32/6
Imperial	12 × 10	8¾ × 6½	6/-	42/-
Panels	17 × 12	12 × 7	11/-	80/-





No 343.

343.—**Frame Mounts** (Adams & Co.)

Well made imitation leather frames, with all the edges glued ready for folding over. Cardboard backs are supplied, with an ingenious arrangement permitting the ring at the back to be moved as desired for landscapes or portraits. They are sort of ready made *passe-par-touts*, and are for exhibiting photos in a cheap and effective manner, and also serve to

use up some of the waste glass that many of we plate-spoilers have lying about. The packets contain frames of three shapes, and six different patterns.

Prices—12, ¼ plate, 1/-; 8, ½ plate, 1/-; 6, ¼ plate, 1/6; 6, 12 × 10, 2/6

344.—**The Professional Print Drying Pad** (Percy Lund & Co.)

A very simple arrangement, by which the ordinary printing frame can be utilised as a press for drying and flattening prints between blotting paper. Each pad consists of forty sheets of strong blotting paper of the requisite size, and two flat pieces of metal. The prints are placed between the sheets of blotting, and then a metal plate at top and bottom. The whole is then put in the printing frame (the hinged back having been removed) and clamped under the springs. There is practically nothing in it, but it is just one of those little conveniences which help a photographer out of his difficulties, or in emergencies.

Prices—¼ pl., 6d.; ½ pl., 1/-; ¼ pl. 2/-

VARIOUS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Plate Boxes.

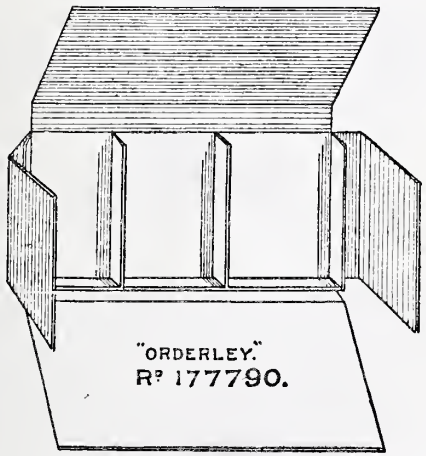
Eclipse Plate Box	Metal Grooved	Sand's Book
Houghton's Tin Box	Purnell's Portable	Wolff's Negative

Frames.

Marion's Transparency | Metal Rims

The following were described in "Photography Annual," 1891:—

Negative Storage.	Frames, &c.	Albums.
Bags ... . Lund	Card-binding Clips ...Tylar	Interchangeable Leaf...Lund
Box ... ...Lewis	Diamond Hangers ...Lund	Snapshot... ... .. Adams
Envelopes ... ...Tylar	Frames ... ...Slater	Table Display ... ...Lund
Unique ... ... ,,	Show Cases ... ...Lund	
Unique Cases ... ... ,,	Silverine Hangers ... ,,	



No. 345.

345.—**The "Orderly" Folio** (E. R. Weare).

Another solution of the question, "What shall we do with our prints?" It is a case with three divisions, lined in gold, to hold mounted photographs; strong, neat, and extremely useful.

Price—to hold 60 cabinets, 3/3.

346.—**Snap-shot Albums** (Percy Lund & Co.)

The firm in sending one of these neat albums for review say:—"Although our price is the same, or very little higher than that charged for a German article, the quality of our album is infinitely superior. The German-made album looks showy when bought, but before long the imitation gold tarnishes, the boards which contain free-sulphur discolour, the prints mounted therein and the badly fixed leaves come out of the binding. For our albums only pure boards are used." The boards are certainly of good quality, and the album well bound. The size of the one sent, superficially, is 9 × 7 inches, which, however, I think is a trifle large for snap shots, for which they are recommended, but, of course, that is a matter of opinion entirely.

Prices—¼ pl., 1/-; ½ pl., 2/6.



No. 347.

347.—**Transparency Frames** (J. Fallowfield).

These are of brass, handsomely lacquered, with burnished edges. The borders consist of coloured glass in red, blue, and yellow. The frames are issued complete, with ground glass to back the transparency, and rings for hanging.

Prices—

	Each.	Per doz.		Each.	Per doz.
3¼ × 3¼ ..	1/3	15/6	8½ × 6½ ..	2/3	27/-
4¼ × 3¼ ..	1/4	16/-	10 × 8 ..	3/-	36/-
5 × 4 ..	1/6	17/-	12 × 10 ..	4/3	50/-
6½ × 4¾ ..	1/9	20/-	15 × 12 ..	6/-	68/-
7½ × 5 ..	2/-	22/-			

348.—**Multiple Portrait Holder** (W. Tylar).

This neat form of holder for portraits will be sure to please. It consists of three semi-circular pieces of papier maché strongly riveted together, the front panel being painted in oil colours in different designs of an attractive nature. The photographs are held in position, as shown in the engraving, all that is needed being to push them into position in slots provided for that purpose. Instead of hiding photographs in books they can be tastefully displayed about the house or shop. These holders can be hung up on the wall, or stood on a table or mantlepiece at option. Each holder



No. 348.

accommodates a row of 9 C.-d.-V.'s and 9 cabinet photographs. The quality of the front panel regulates the price, all are equally well made in every other respect.

Prices, 3/-, 3/6, and 4/- each.



No. 349.

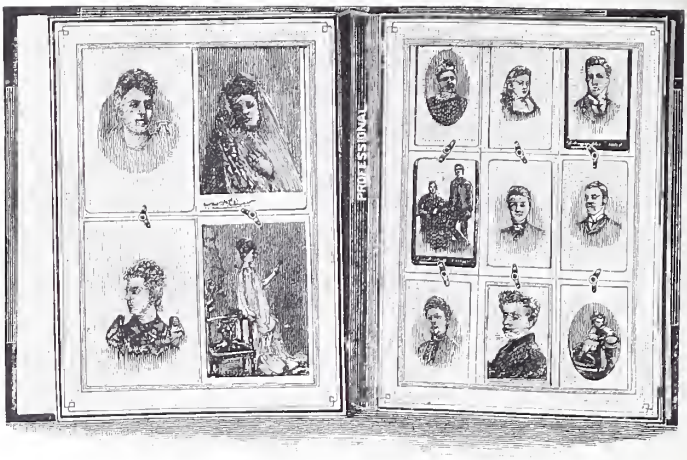
349.—**The "Display" Stand** (McGhie & Co.)

This is a metal stand, nickel-plated, arranged for twelve or twenty-four cabinets, which are held firmly by spring clasps, so that they can be revolved round the upright. A very useful thing for the reception room.

Price 6/6.

350.—**The "Professional" Specimen Album** (Lund & Co

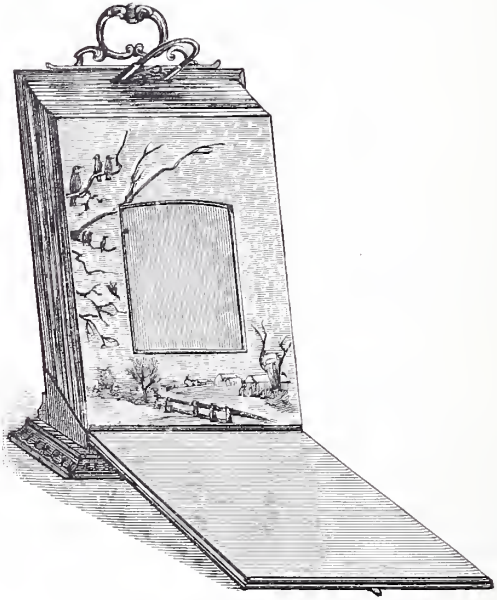
This is intended for show-room use. The labour of insertion in slits as in ordinary portrait albums, or the troublesome elastics in other display patterns, are equally obviated by a neat arrangement of clips and rebate or



No. 350.

groove. The album closes uniformly, however many or few portraits be in, and has 10 leaves 16 × 13 inches, holding 36 Carte-de-Visites and 64 cabinets.

Prices—Half bound, £1 5s. ; full morocco, £1 15s.



No. 352.

351.—**Reception Room Album** (Marion & Co.

The firm have just introduced a new album for the reception room, of handsome appearance, and taking four cabinets on a page, in 28 leaves.

This should be useful for showing sitters specimens of different styles, as placing eight ¾-lengths, eight vignette heads and so on together, enables the sitter to quickly make up his or her mind.

Price 20/-

352.—**Table "Display" Album** (McGhie & Co.)

Another useful adjunct to the reception-room table. The illustration shows it so thoroughly that description is unnecessary. The prices vary according to style and quality from 14/6 to 42/- each.

353.—**The "Autocrat" Self-binding Album** (G. S. Martin).

This is a new issue of the well-known Zaensdorf self-binding albums. Any number of mounts may be bound into one cover, from 3 to 50 or more. The process of binding consists in simply lacing the mounts into the covers, an operation easily performed. The book may be as easily unbound, rearranged, or the number of mounts increased or decreased. Prints may be placed upon both sides of the mounts, thus saving space and expense, and the album thus formed will lie open quite flatly at any page, the double-guard giving great flexibility. Mounts are in three colours: cream, slate, and French grey, with plain, gilded, or carmine edges.

Prices—

Size of Print.	Size of Board.	25 Mounts and Covers complete.	25 Gilt or Carmine-edged Mounts and Covers complete.	Refills per dozen.	Gilt or Carmine-edged Refills per dozen.	Covers, back and lace, complete, without Mounts.
4¼ × 3¼	6 × 4½	3/-	3/6	1/-	1/3	1/2
5 × 4	7 × 5½	3/6	4/2	1/2	1/6	1/4
6½ × 4¾	10 × 7⅝	5/-	5/10	1/10	2/3	1/6
7½ × 5	12 × 9	6/6	7/6	2/4	2/10	2/4
8½ × 6½	13 × 10	8/3	9/6	3/-	3/7	2/8
10 × 8	15½ × 12	10/-	11/6	3/10	4/6	3/-
12 × 10	18 × 15	14/-	15/6	5/4	6/1	3/4

354.—**The "Aptus" Scrap Albums** (Sharp & Hitchmough).

With removable leaves. These are held together at the back by two screw studs, which can be easily and quickly undone with a penknife. The leaves can then be transposed, or removed, and fresh leaves inserted at will. Half-bound French morocco quality containing 30 leaves.

Prices— 11½ × 9 6/- 14 × 10 8/3 16 × 11½ 11/3

355.—**"Snap-shot" Albums** (Morley & Cooper).

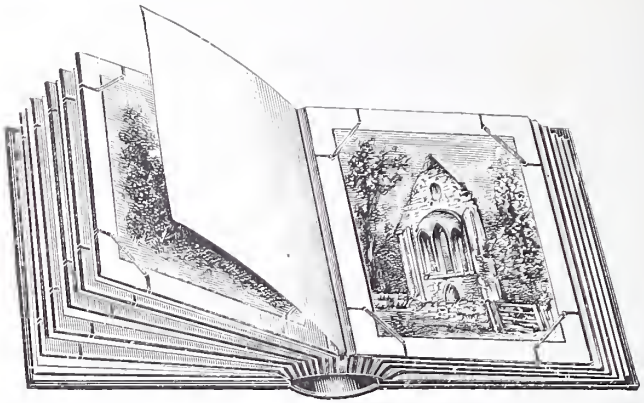
These are the best albums I have seen for ¼-plate prints, whether hand camera or otherwise. The cheaper variety is oblong, a feature that must at once commend itself, and this, together with the neat size, 6 × 4½, should make it a great favourite. The better quality is bound in morocco and padded, the pages are india-tinted, with gilt edges, and the whole makes a very handsome little book.

Prices—

Oblong, cloth bound, 48 prints 1/-
Padded morocco 48 ,, ... 3/-

356.—**The Photographer's File.**

This has been sent me by so many of our dealers and manufacturers that I am compelled to leave out all names. It is in the form of a book, neatly cloth bound and gold lettered. The leaves are of extra stout grey



No. 356.

card, with strong indiarubber bands or wires at the four corners, so arranged that they not only keep the photographs flat, but at the same time protect them from injury. The capacity of the book is almost unlimited, as each leaf will hold a large number of photographs.

Prices—¼ pl., 2/- ; ½ pl., 3/- ; ¼ pl., 4/6.

PART IX.

COMPLETE SETS AND VARIOUS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Bracker's Distiller
Hydrometer
Godstone Carrier Lock
Newton's Electric Bell
Foxall's Folding Box
Hinton's Chemical Labels
Mitre Cutting Machine
Newton's Electric Lamp
Schanschieff ,,

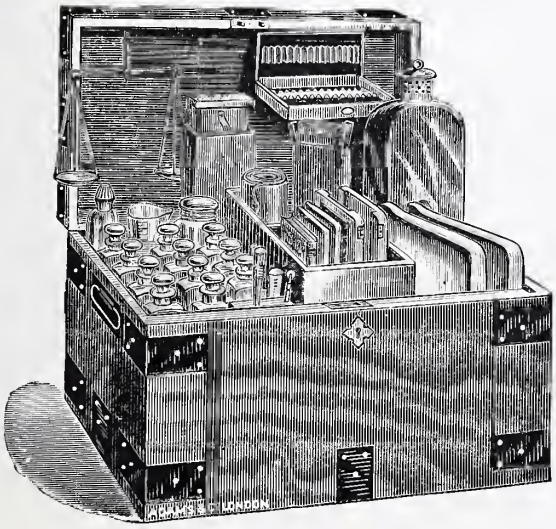
The following were described in "Photography Annual," 1891:—

Anschutz's Zoetrop ... ...
Aptus Etching Plates ... ...Sharp
Bromide Register ... ...Wheeler
Chemical Case ... ...Ross
Evening Set ... ...Stereo Co.
Labels ... ...Wheeler
Outfit Cases ... ...Skinner
Photo Stains ... ...Whittaker
Preservative Paper ... ...Wheeler
Spring Catch ... ...Tylar
Valentine's Photo Series ... ...
Electric Call Bell ... .Tylar
Price Lists ... ...Lund
Receipt Book ... ... ,,
Studio Register ... ... ,,
Trevor's Wrappers ... ...Fallowfield

COMPLETE SETS.

357.—**Adams & Co.**

THE "VICTOR"—Double extension long focus camera (see No. 12). "Challenge" rapid rectilinear lens. One double dark slide. Tourist stand of polished walnut. Price £5 10s.



No. 358.

THE CLUB DEVELOPING AND PRINTING SET.—A complete out fit of best quality goods, packed in strong chest for travelling. All chemicals are in stoppered bottles. Tin light-tight box for 12 plates. Two mahogany printing frames. Two celluloid dishes. One deep porcelain dish. One ditto for hypo. Lamp. Scales and weights. Focussing cloth. Draining rack. 2-drachm measure. 6-oz measure. 10 ozs. negative varnish. Pyro bottle and pyro. ½ lb. ammonia. ½ lb. sulphite soda and bottle. ½ lb. acetate of soda. ¼ lb. potassium bromide. Two 16 oz. stoppered bottles. 1 lb. hypo. 1 lb. alum. ¼ lb. citric acid. 4 ozs. gold solution. Sensitised paper box. Two packets sensitised paper. 2 doz. plates. Mountant. Two brushes. Two vignette glasses. Masks and discs. Two cutting shapes. Trimming knife. Book of instruction. Strong chest, iron bound and polished, suitable for travelling.

Prices—	¼ pl.	½ pl.	¼ pl.
	£4 4 0	£5 10 0	£6 6 0

358.—Archer & Sons.

No. 1. Quarter-plate camera and dark slide. Achromatic lens, ruby lamp, printing frame, ebonite dishes, plates, chemicals for both negatives and prints, paper, mounts, &c., with instruction book in case. Price £1 1s.

No. 2. A superior set in several respects. Price £1 12s. 6d.

No. 3. Same as No. 2, but with a superior camera, having swing back, rising front, &c., &c. Price £2.

No. 4. Camera, with double extension leather bellows, side rack and pinion focussing, reversing back, instantaneous lens, Iris diaphragms, instantaneous shutter, cap for time exposures, double dark slide, tripod folding stand, superior ruby lamp, &c. Price £2 15s.

No. 5. Half-plate size, for taking pictures 6½ × 4¾ inches. Price £3 10s.

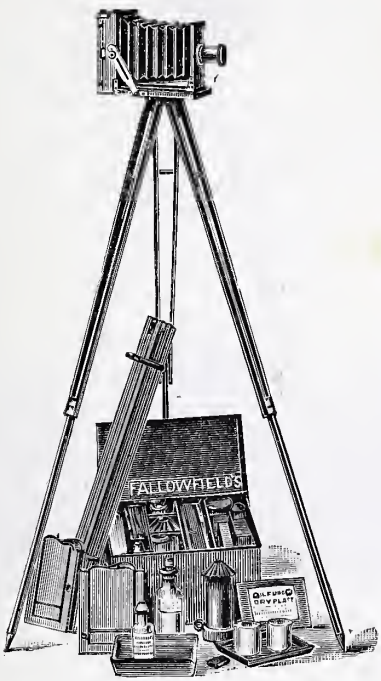
No. 6. Half-plate size, for taking "instantaneous" pictures Price £5.

No. 7. Half-plate size, for taking "instantaneous" and all other kinds of pictures, fitted with a rapid rectilinear lens, a Thornton-Pickard, adjustable time and instantaneous shutter, and everything complete as in No. 2 set. Price £7.

359.—A. H. Baird.

THE "LOTHIAN" No. 1.—For quarter and half plates, and a very complete outfit. Wide-angle camera and three double slides. Carriers for six ¼-plates. Casket of lenses, comprising rapid rectilinear, wide-angle rectilinear, and rapid view, with Iris diaphragms. "Adjustable to height" camera stand. Waterproof case for same. Velvet focussing cloth. Compound focussing lens. Watkins exposure meter, Thornton-Pickard instantaneous and time shutter. View finder for shutter work. Best solid leather case, carrying all field requisites. Dark room ruby lantern with adjustable flame. Two sheets ruby paper. Dusting brush. Portable plate washer and drainer. One dozen each half and quarter plates. One each storing box for 50 half and quarter plates. Trays for developing, and for the alum, toning, and fixing baths. Two graduated measures. Set scales and weights. Three bottles 10 per cent., sulpho-pyrogallol developer, Nos. two and three, in drop bottles, ensuring accuracy. One bottle alum. One bottle soda hyposulphite. Two bottles intensifying solution. One bottle negative varnish. Three sheets sensitive paper, *cut to size*. Metal air-tight box for same. One bottle concentrated toning solution. Four printing frames. Wood's print washer. Assortment of mounts. Note book and book of instructions.

Price £20.



No. 360.

360.—**J. Fallowfield.**

THE "WEST END," for half-plates.—Conical bellows camera, reversible back, swing back, two double dark slides (book form), rapid rectilinear lens, with Waterhouse diaphragms, folding tripod stand, one dozen plates, developing solution, trays for developing and fixing, dark room lamp, developing cups and graduated measure; fitted in strong box complete.

Price £5.

361.—**J. J. Griffin & Sons.**

THE "STUDENT'S."—Camera (square bellows form), one double slide, achromatic view lens, folding tripod stand, soft canvas case, and focussing cloth.

Prices—¼ pl., £3 7s. 6d.; ½ pl, £4 10s. 6d. Developing and printing apparatus for above—¼ pl., £1 15s. 8d.; ½ pl., £2 8s. 6d.

362.—**J. Lancaster & Son.**

For convenience sake these are grouped together in the following manner :—

A. Camera and slide, lens, stand.

B. Has in addition, one dozen plates, dishes, solutions and lamp.

C. Has in addition, sensitised paper, toning solution, dishes, and printing frame.

D. Complete outfit, containing in addition to the foregoing many other things. The whole in a polished box with lock and key.



No. 361.

Title.		¼ pl.	½ pl.	¼ pl.	12 × 10
1892 Merveilleux	A	£1 1 0	£2 2 0	£3 3 0	£5 5 0
,,	B	1 7 6	2 12 6	3 15 0	6 15 0
,,	C	1 12 6	3 2 6	4 10 0	8 0 0
,,	D	2 2 0	3 17 6	5 10 0	
1892 Meritoire	A	1 11 6	3 3 0	4 10 0	7 10 0
,,	B	1 17 6	3 15 0	5 10 0	9 0 0
,,	C	2 2 0	4 5 6	6 5 0	10 5 0
,,	D	2 12 6	5 0 0	7 5 0	
1892 Instantograph	A	2 2 0	4 4 0	6 6 0	10 10 0
,,	B	2 8 6	4 16 6	7 6 0	12 0 0
,,	C	2 13 6	5 7 0	8 1 0	13 5 0
,,	D	4 4 0	7 7 0	10 10 0	20 0 0
Aluminium Instanto	A	3 3 0	5 10 0	8 0 0	
(See page 22)	C	3 15 6	6 15 0	9 15 0	
Brass-bound Instanto	A	2 10 0	5 0 0	7 10 0	11 11 0
,,	B	2 16 6	5 12 6	8 8 0	13 1 0
,,	C	3 1 6	6 3 0	9 2 0	14 6 0
,,	D	4 12 0	8 5 0	11 11 0	21 0 0
International	A	2 10 0	5 0 0	7 10 0	11 11 0
,,	C	3 1 6	6 3 0	9 5 0	14 11 0
Improved Special	A	4 0 0	6 0 0	8 0 0	12 12 0
,,	D	8 8 0	12 12 0	16 16 0	25 0 0
Extra Special	A	4 4 0	6 6 0	8 8 0	12 12 0
Special 1892	D	8 8 0	12 12 0	16 16 0	25 0 0
Ladies	A	1 15 0	3 0 0	4 5 0	
,,	B	2 2 0	3 10 0	5 0 0	
,,	D	2 10 0	4 4 0	6 0 0	
Boy's Own	D	1 1 0	2 2 0	3 3 0	
Amateur	D	2 10 0	4 4 0	6 0 0	9 0 0

363.—The London Stereoscopic Company.

This firm make a great speciality of sets and complete outfits. I have grouped the details as follows:—

A. Camera, lens, and tripod.

B. The laboratory outfit, consisting of chemicals, developing lamp, trays, printing frame, sensitised paper, &c., complete in box or case. These, of course, vary in their completeness and quantities. In the sets commencing with the "Popular," the company's standard negative and print is included.

C. Complete outfit, that is, A and B combined.

"THE YOUTH'S."—A cheap set. Plain folding camera, landscape lens, one double slide and tripod. *Price*, ¼ pl. A, £1 1s.

"THE COMPLETE."—Same as foregoing, but with B added. *Price* ¼ pl. C, £2 4s.

"THE ETON."—A better quality apparatus; better camera and folding tripod. *Price*, ¼ pl. C, £3 10s.

"THE POPULAR."—Good folding camera, bellows body, rapid rectilinear lens. The box measures 26 × 8 × 9 inches, with handle, lock and key, portable folding tripod. *Price*, ¼ pl. C, £5 5s.

THE "PORTABLE."—Plain camera of "Tourist" pattern. Leather bellows, three double backs, rapid rectilinear lens, leather case, with lock, key, and handle. *Price*—¼ pl., £5 10s.; B extra, £1 10s.

THE "CYCLIST'S"—Same as foregoing, but packed in square canvas or leather case, and cycle clip or tripod as desired. *Price*—¼ pl. A, £6 6s.; B extra, £1 11s. 6d.

THE "INDIA."—Very good camera, leather bellows, rack and pinion focussing, double swing back, double movement front, three double slides, rapid rectilinear lens, tripod, solid leather case, with lock and key and handle.

Prices—									
	¼ pl.	A	£10	10	0	B extra	£1	11	6
	½ ,,	A	£14	14	0	B ,,	£3	3	0

THE "INDIA" LONG EXTENSION.—Same as foregoing, but the camera has double extension and reversing back.

Prices—									
	¼ pl.	A	£12	12	0	B extra	£1	11	6
	5 × 4 ,,	A	£14	14	0	B ,,	£1	11	6

THE "INDIA" PATENT.—Much the same, but with a better camera.

Prices—									
	¼ pl.	A	£12	12	0	B extra	£1	11	6
	5 × 4 ,,	A	£14	14	0	B ,,	£1	11	6
	½ ,,	A	£16	16	0	B ,,	£3	3	0

THE "COLLEGE."—Best quality "Tourist" pattern camera, leather bellows, double movement front, rack and pinion focussing, two double slides, rapid rectilinear lens, very portable tripod. The whole packed in polished mahogany box, 26 × 8 × 9 inches, with lock and key *Price*—½ pl. C, £10 10s.

THE "YACHTING" No. 1.—Plain mahogany bellows camera, folding and portable. Three double slides, rapid rectilinear lens, travelling case. *Price*—7½ × 5 pl. C, £21.

THE "YACHTING" No. 2.—The company's patent camera. Other details the same. *Price*—7½ × 5 pl. C, £25.

THE "WHOLE PLATE."—The camera is of the "Tourist" pattern, leather bellows, screw focussing, double swing back, double movement front, three double slides, rapid rectilinear lens, instantaneous shutter, best tripod stand, leather travelling case.

Prices—	¼ pl. C	10 × 8 C	12 × 10 C
	£30 0 0	£40 0 0	£50 0 0

364.—**London and Paris Optic Co.**

THE "EARL."—Camera with long focus conical bellows, rack and pinion adjustment, reversing and swing back, rising front, &c. Rapid rectilinear lens. Two-fold lock joint tripod. One double dark slide.
Prices—½ pl , £5 ; ¼ pl., £7 5s.

365.—**Marion & Co.**

THE NONPAREIL for plates 4¼ × 3¼, camera, slide, lens, stand, focussing cloth, plates, dishes, solutions, etc. *Price* £1 10s. Printing set, 12/6 extra.

THE "A.B.C."—Similar to the foregoing, but better finished. *Price* £2 5s. Printing set, 23/- extra.

THE "STUDENT'S."—Similar, but for 5 × 4 plates. *Price* £2 10s. Printing set, 25/-

THE "OXFORD."—Camera has reversing and double swing back, rising front, etc., 6½ × 4¾. The other things are lens, tripod, focussing cloth-plates, chemicals, dishes, lamp, etc. *Price* £5. Printing set, extra 30/.

THE "NEW" (for camera see No. 4 part I.) Complete with all accessories, *Price* £7.

THE "UNIVERSITY."—Similar to the "Oxford," but for plates 8½ × 6½, £10. Printing set, extra £2.

THE "ENGINEER," for plates 12 × 10.—Camera of the most improved type, with special lens for buildings, machinery, &c. *Price* £22. Printing set extra, £4.

THE "SUPERIOR."—Best Spanish mahogany camera with bellows body, rack and pinion focussing, reversing and swing back, and rising front, three double backs, rapid rectilinear lens, folding tripod, cases for camera and tripod. Quarter gross plates, and bottles of developing solutions (ammon. and eikonogen cartridges), rocking and celluloid trays, zinc washing apparatus, ruby lamp, glass measures, draining rack, &c., all packed in polished black pine case.

Price—	Set.	Printing Set extra.
¼ pl.	£10 10 0	£1 10 0
½ pl.	17 0 0	2 5 0
1 pl.	20 0 0	3 0 0
12 × 10	34 0 0	5 0 0

THE "EMPIRE."—Spanish mahogany camera, brass bound, bellows body, screw adjustment, double swing, double sliding front, reversible holder, three double dark slides, brass bound, Voigtlander's enryscope lens, folding tripod stand, Cadett's patent lightning shutter, with pneumatic release, velvet focussing cloth, best solid leather case with lock (to contain camera, three slides, lens, shutter, and focussing cloth), waterproof case for stand, three dozen Britannia dry plates, rocking developing tray, three glass trays, reflector developing lamp, registered automatic plate washer and drainer, bottle of Britannia developing solution, liquid ammonia, and a box of eikonogen cartridges, alum, hypo, two glass measures. All in a solid polished mahogany case, lined green baize, with lock and key.

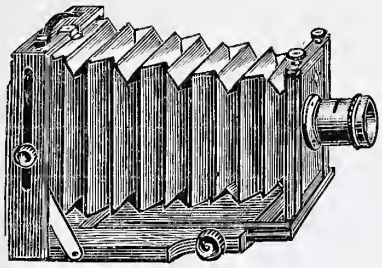
Price—	Set.	Printing Set extra.
1 pl.	£37 0 0	£3 0 0
12 × 10	55 0 0	5 0 0

366.—**Robert C. Murray.**

THE "POPULAR."—Conical bellows camera of extreme portability, with long range of adjustment for focussing by means of rack and pinion and fixing rod screws, rising and falling front, swinging back, reversible

holder for slides, hinged focussing glass, rapid rectilinear lens, and tripod folding stand.

Price, with one double slide, ½ pl., £5 ; ¼ pl., £7 5s.



No. 366.

367.—**Noakes & Son.**

THE "INVICTA."—Portable camera, hinged focussing screen, polished tripod, capital achromatic view lens, double dark slide with turn back shutter, will take pictures horizontal or vertical. *Price* 21/-

THE "INVICTA" COMPLETE has, in addition, one dozen plates, ruby lamp, two trays, graduated glass, printing frame, developing, fixing, and toning solutions. Complete in polished case with "Manual of Photography." *Price* £1 16s.

368.—**Parker & Co.**

THE "COMPANION."—Camera (see No. 28) with three double dark slides, R R. lens with Iris diaphragm, travelling case lined with green cloth, three-fold tripod, focussing cloth, instantaneous shutter (Kershaw).

Prices—	½ pl.	¼ pl.	12 × 10	15 × 12
	£14 15 6	£18 10 6	£28 19 6	£34 9 6

THE "COMPANION."—Same as foregoing, but with chemical chest (lock and key), containing all the necessaries for developing and printing.

Prices—	½ pl.	¼ pl.	12 × 10	15 × 12
	£17 18 6	£22 14 6	£34 14 6	£40 15 6

THE "STUDENT'S" Camera, with one double slide, lens, and tripod.
Prices—¼ pl., £2 2s. ; ½ pl., £4 4s.

THE "LADIES" camera, one double slide, view lens, tripod stand, focussing cloth, dark room lamp, developing tray, one dozen dry plates, graduated measure, printing frame, sensitised paper and chemicals; packed in strong box.

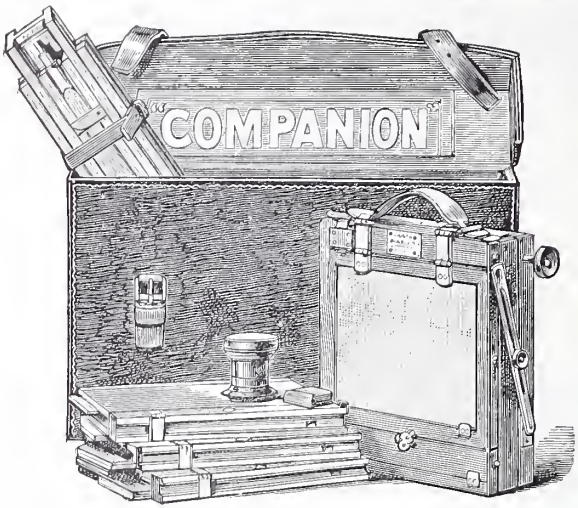
Prices—¼ pl., £4 4s. ; ¼ pl., £7 7s.

"COMPANION" CAMERA (see No. 28).—Three double dark slides, view lens, four-fold tripod stand, focussing cloth, all fitting in waterproof travelling case, velvet lined.

Prices—½ pl., £9 12s. ; ¼ pl., £12 8s.

369.—**Reynolds & Branson.**

THE "POPULAR."—Long focus camera, with reversing and swing back, rising front, and three double dark slides, rapid rectilinear lens, Phœnix shutter, waterproof case with shoulder strap. Half-plate £7 15s. ; ¼ plate, £10 15s.



No. 368.

No. 1.—The Beginner's Set: Portable mahogany camera, lens, one double dark slide and folding tripod stand, two developing dishes, one dozen dry plates, measure, canary medium, rack for washing plates and the necessary chemicals for development, £1 7s. 6d.

No. 2.—The same but for ¼ plate size, £3 12s. 6d.

No. 3.—The Student's Set: Camera, rectilinear lens, and sliding tripod, one double dark slide and folding tripod stand, two developing dishes, one dozen dry plate, measure, canary medium, rack for washing plates and the necessary chemicals for development, ¼ plate size, £3 17s. 6d., ½ plate size, £4 16s.

No. 5.—Lantern Set: Portable camera for 3¼ by 3¼in. negatives, with three double dark slides, double swing-to back, vertical and horizontal movement to front, with rectilinear lens, 3½in. focus, the front lens of which can be used as a single lens of 7in. focus, £5 5s.

No. 6.—Portable tourist camera, for ¼ size plates, double swing-to back, leather bellows, and double rising front, three double dark slides, sliding tripod, and rapid rectilinear lens; two ebonite dishes, two dozen dry plates, best developing lamp, glass measure, and the requisite chemicals for development, £5 15s.

No. 7.—Portable tourist camera, for ½ size plates, double swing back, leather bellows, double rising front, three double dark slides, sliding tripod, rapid rectilinear lens, one dozen dry plates, washing trough, ruby lamp, two developing dishes, two glass measures, and the requisite chemicals for development, £8 15s.

No. 9.—Portable tourist camera for negatives up to 8½ and 6½, double swing back, leather bellows, and double rising front, three double backs, sliding tripod, rapid rectilinear lens, one dozen dry plates, washing trough, ruby lamp, two ebonite dishes, two glass measures, and the requisite chemicals for development, £12 10s.

370.—**W. B. Whittingham & Co.**

1892 "SPECIAL."—Long focus portable camera, with double dark slide, single combination lens, folding tripod, and instantaneous shutter.

Price—	¼ pl.	½ pl.
	£2 10 0	£4 4 0

THE "STUDENT'S."—Similar camera to the foregoing, focussing cloth, plates and all chemicals, lamp, measure glasses and dishes, printing requisites.

Price—	¼ pl.	½ pl.	¼ pl.
	£3 12 0	£6 7 6	£7 10 0

THE "STUDENT'S" No. 2 has three double slides to the camera instead of one, extra dishes, frames and chemicals, focussing magnifier, &c., in polished wood chest.

Price—	¼ pl.	½ pl.	¼ pl.
	£5 0 0	£7 7 6	£9 10 0

THE "UNIVERSAL."—A complete set of both negatives and prints, including everything needed (except mounts), in a black wood divided chest, with lock and key.

Price—	¼ pl.	½ pl.	¼ pl.
	£10 7 0	£12 9 0	£17 4 0



No. 371.

371.—**C. S. Wood & Co.**

THE "PAUSODONOPTIC"—Camera with leather bellows, in stained mahogany, folding tailboard, lens, cap, double dark slide, plates, developers, &c., all packed in box.

Price 5/6.

372.—**Micro-photographic Sets** (Watson & Sons).

These are intended for use with the cameras noticed on pages 362 to 365, except that limelight is not suitable to the Van Heurck Camera, No. 111.

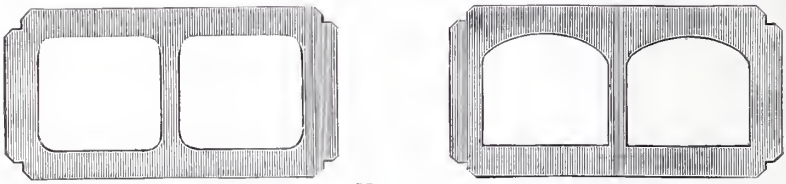
OIL LIGHT MICROSCOPE LAMP.—Stand condenser and focussing glass. *Price* £1 10s. 6d.

OIL LIGHT MICROSCOPE LAMP.—Fitted with bull's-eye condenser, projection eye-piece, focussing glass. *Price* £5 5s. 6d.

LIMELIGHT (Oxy-calcium).—Jet gas cylinder, regulator, tubing, condenser on stand with centring screws, focussing glass, projection eyepiece. *Price* £10 10s. 6d.

LIMELIGHT (Oxy-hydrogen).—Same as foregoing, but with different jet, two cylinders and two regulators. *Price* £14 10s. 6d.

VARIOUS.



No. 373.

373.—**Stereoscopic Metal Frames** (Jas. Moore).

These are a continued series of this maker's well-known metal binding frames for lantern slides, adapted for stereoscopic transparencies. One novel feature, however, is the insertion of an enamelled tablet at both ends of the frame, upon which the title of the slide may be written. They are very neat and should prove of valuable assistance to workers in stereoscopic slides.

Price—$6\frac{1}{2} \times 3\frac{1}{4}$ or $6\frac{3}{4} \times 3\frac{1}{4}$, 2/6 per dozen.



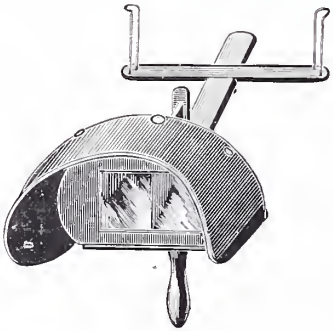
No. 374.

374.—**Stereoscopic Mounts and Masks** (Wormald & Co.)

A series of mounts and masks for stereoscopic slides, as follows :—

No. 1. For glass transparencies.
No. 2. For paper and celluloid transparencies.
No. 3. Cut out fronts and mounts for paper prints.

Prices—No. 1, 1/6 box ; Nos. 2 and 3, 2/- box.



No. 375

375.—**The "Norden" Cheap Sliding Stereoscope** (S. and J. Mitchell).

A handy and convenient stereoscope, at a moderate price. Four qualities are made.

Prices—4/-, 4/6, 5/3, and 6/-

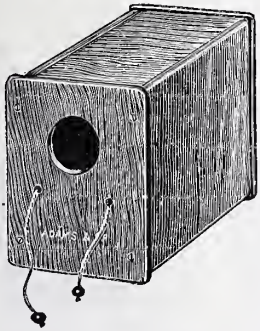
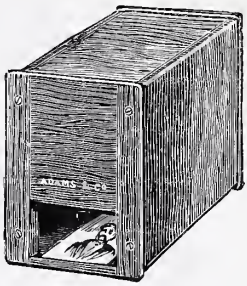


Fig. 1.



No. 376. Fig. 2.

376.—**The Torsioscope** (Adams & Co.)

This is certainly more of a scientific and amusing novelty than a piece of photographic apparatus. Yet, as its purpose is to torture and twist the portrait about, it will prove very interesting to photographers. By means of an undulating lens, revolved by pulling a string, the face, which is seen upright and the right way about, assumes the most ludicrous aspects. A portrait, cabinet or carte size, is placed in the groove as shown in fig. 2, the eye placed to the hole shown in fig. 1, and the string pulled slowly. And then—well, then the changes are simply astounding. First perhaps the face broadens out, the nose grows longer, the chin becomes square ; next everything turns narrow, the eyes contract, the mouth shoots up, and so on. In fact, the variety is practically unlimited, because a movement of the photo will produce another lot of changes altogether. Photographers really have no conception how hideous and awful they can see themselves or their friends represented. In the reception room it will keep the waiting sitter in good humour ; in the home of the amateur it will be a most amusing way to entertain a friend for half-an-hour ; and at *conversazioni* it will prove a great attraction and provoke shrieks of laughter. There are two points about it worth knowing, and the first is that a large head, say, a cabinet head and shoulders, or a caricature big head and little body, will give the best effect. The other point is that in showing it to a friend put your own photos in, not his. He will laugh more.

Price 15/-

377.—**The Anschutz Tachyscope** (Blackfriars Photo Co.)

This is in reality a cheaper form of the instrument noticed on page 587, Phot. An., 1891. The apparatus consists of a circular box a foot or so in diameter, in the centre of the cover of which is a hole supported by a wooden disc. Inside the box will be found the three parts of a stand which, when put together with the corner of the box on the top, enables the latter to be revolved easily and at any speed required by the hands. Besides the remainder of the apparatus, ten strips or slides are contained in the box. These are of a length to exactly fit into the upturned cover of the box before referred to. Each strip is about twice the depth of the pictures ; the upper portion being pierced by the requisite

slits through which to view the pictures as they pass the eye. The series embrace some of Anschutz's most striking and popular effects, such as the flying stork, the marching soldier, the jumping goat, the running man, as well as the movement of the dog, the horse, the camel, &c. These are reproduced exactly from the different series of Anschutz's pictures, and when viewed through the instrument reproduce the movement of each, and are photographed with life-like exactitude. This pleasing toy has been a commercial article in Germany for some few months and it has been introduced to the public of this country by the above firm. As an instrument for amusement in winter evenings it should prove wonderfully attractive.

The ten examples included in the box are the following:—







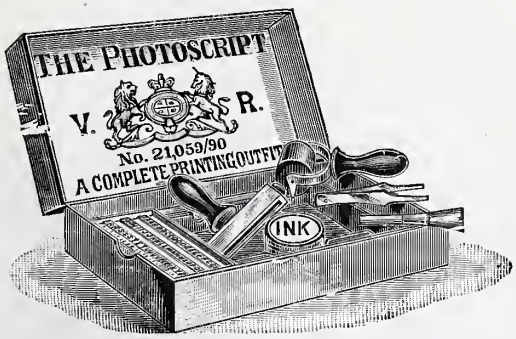





Price 7/6.

378.—**The "Photoscript"** (M. Lindner).

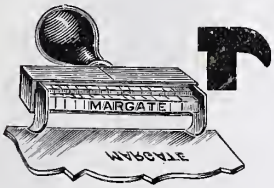
A series of metal-bodied rubber type, for printing the titles or numbers upon negatives, which should supersede all the older clumsy methods. The types are reversed, each one having its letter or character facing to the right, instead of to the left as usual. As soon as the desired wording is set up in the holder, it is inked by a roller, impressed upon the film, and then dusted over with a deep ruby gold bronze powder, rendering it quite opaque. I find the roller much easier to work than the ordinary pads, but

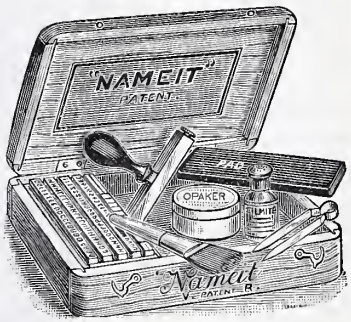


No. 378.

the ink requires rolling even upon a piece of glass before use. The result is everything that can be desired, and the cost trifling.

Price 8/-





No. 379.

379.—**"Nameit"** (A. Gray).

An important improvement has been made in this since last year, Phot. An. 1891, page 817. The films that were formerly necessary have now been done away with, reversed letters being substituted. The impression is now made direct upon the negative. The change of course prevents the use of the type as ordinary stamps, but they are not issued for this purpose, and as the printing direct upon the negative is so much easier, the change will not be regretted.

Prices—8/6 and 12/6.

380.—**Malloch's Etching Process** (A. H. Baird).

A sheet of perfectly smooth glass is covered with a preparation which, when dried, has all the appearance of a coat of yellowish oil paint, only that it possesses considerable translucency. The pigment adheres firmly to the glass, and at the same time is capable of being easily removed by a needle point, leaving the glass exposed in perfectly clean cut lines. A drawing more or less elaborate is thus made.

This simple process provides the draughtsman with a surface, which admits freedom of the hand, and which also receives and retains the slightest and sharpest touches of the etching point. It enables the operator to produce any number of prints from original drawings in black and white, sepia, &c. The etching to be done on the glass may be either



No. 380.

sketched with a lead pencil or traced down on the prepared surface by means of carbonised paper. By putting the plate on a piece of dark cloth while working on it, the most delicate touch of the etching point will be plainly seen. The many and varied processes of photographic printing are then resorted to, enabling the artist to reproduce in greater or less numbers as may be required.

I find these plates also very useful in the lantern for rapid production of sketch or map, or, easier still, a plain piece of writing. For the last purpose I have used them constantly to project Christmas or special greetings, jokes, &c., upon the screen. The substance is sufficiently opaque, and the result upon the screen is letters of white upon a black ground.

Prices—Per dozen ¼ pl., 3/-; ½ pl., 6/-; ¼ pl., 10/-

381.—**Animal Photographs** (G. W. Wilson & Co.)

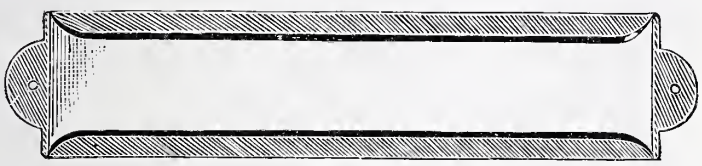
A very fine set of 12 × 10 carbon enlargements from negatives by the well-known animal photographer, Chas. Reid, of Wishaw, N.B. All are good, and several of them really magnificent. The set consists of sixty, and includes nearly all the domestic and farm-yard varieties, horses, cattle, sheep, dogs, cats, poultry, pigeons, owl, and even birds' nests and eggs. When framed they decorate a room most attractively.

Prices—Unmounted, 3/-; mounted, 4/6.

382.—**Photograph of Ice Crystals** (J. Martin & Co.)

A very attractive picture, of which the following is the history:—"This remarkable group of crystals was produced at Christmas, 1891, in a 10in. × 8in. dish of New River water, quite spontaneously, no process or artificial aid having been resorted to to induce the formation. A film of ice was observed floating somewhat loosely in the dish, and on being lifted carefully, disclosed on the under side this marvellously beautiful floral design. The delicate lace-like edging of the glacial tracery is the result of the deposition of hoar-frost while draining off the water from the ice-leaves and flowers, and fixing the image in the camera. The beauty is enhanced by closing one eye, when the leaves and flowers will seem to stand out in actual relief, as in nature, an inch in advance of the background which formed the superficial film of ice while in the dish." It is like a peep at fairyland in winter.

Prices—Cab., silver, 1/-; platinum, 1/6; whole-plate, silver, 2/-; platinum, 2/6; lantern slide, 1/2; 15 × 12 enlargement, 4/6; 20 × 16 enlargement, 7/6.



No. 383.

383.—**Ivorine Tablets** (W. Tylar).

Consist of a neatly-made brass frame, containing a slab of imitation ivory, for attaching to printing frames for the purpose of checking off the number of prints as they leave the frames. Pencil marks are easily removed from its surface with a damp rag, and it is one of those little comforts every professional should secure. These tablets can also be used for putting on drawers or boxes, also for labelling up natural history specimens. The price is low, and appearance all that can be desired.

Price—12 tablets in box, with 24 screens, 1/6.

384.—**Stranding of the S.S. "Eider"** (Chas. Knight).

Considering that these photographs have been reproduced in the *Graphic*, *Illustrated London News*, *Photography*, and *Photographic Review of Reviews*, they will doubtless be well known to many of my readers. I give a list, more for reference sake than anything else :—"Eider," with steam up, from top of cliff, first photo taken after she struck. First launch of "Catherine Swift" (from shore). First journey of "Catherine Swift," crossing the breakers. Preparing three lifeboats to launch. The "Eider" alone (vessel seven inches). The "Eider" alone, salvaging. Too rough to launch lifeboat, one wave 10ft. high, covers the plate. Too rough, another view. "Eider" from distance, showing Needle Rocks, Lifeboat Station, and cliffs. Saving the passengers, all three lifeboats at work. The crew of "Catherine Swift," which saved one hundred and seventy lives, and landed five hundred bags of mails. R. Cotton, coxswain of boat, wearing silver medal and cork jacket, taken after the last of twenty-four journeys. The vessel from the sea, in a boat, showing Atherfield Cliffs in the background. Divers fetching up the mails The main deck strewn with salvage. Salvaging the cotton. Two officers of the ship. The Captain.

Prices—Cab. 1/- ; 8 × 6, 2/-

BOOKS ISSUED BY THE TRADE.

385.—**Ilford Manual of Photography** (C. H. Bothamley).

The first idea upon receiving this manual was, "What, another?" It would appear at first blush that there were already numerous instruction books upon the market, and no doubt there are. But only those who have in society life mixed freely with beginners and novices, or have been privileged to penetrate the mysteries of the editorial sanctum, know how little these books are studied. It is quite true that various funny little points are not to be found dealt with in this or that book, but these queries are as nothing beside the mass of questions asked that five minutes' study of a manual would answer. There are plenty of instruction books, but they are not read, and that is where the trouble lies. For two reasons the work by Mr. Bothamley will command greater attention; the resources of the Ilford Company in bringing it before the very men who need it, by means of the company's innumerable agents, and the fact that though the work is exceedingly complete, the information is concise and clearly put. The instructions given for developing plates, toning paper prints, bromide paper, Alpha paper, &c., of course apply to the specialities of the Ilford Company. But beyond that there is a very great deal of information, boiled down to business-like brevity. I like, too, the candour and straightforwardness of the preface :—"It makes no pretence of being a complete treatise on the principles of the art, and it is not written for those for whom the experimental side of photography has the most attraction. Its aim will be reached if it serves as a trustworthy guide in the actual practice of the art. At the same time, an endeavour has been made to state, in a simple way, sufficient of the principles to enable the reader to work intelligently, and to overcome most of the difficulties that he is likely to meet with. No claim is made for originality in respect of any of the facts, and it has therefore not seemed necessary to state the sources from which even the newer items of information have been collected." It is very well printed and neatly bound in cloth at the popular price of one shilling.

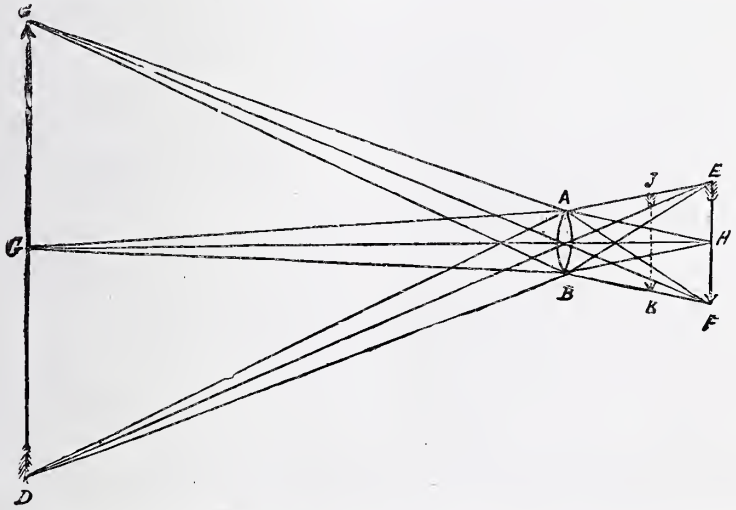
386.—**Photographic Literature** (Percy Lund & Co.)

This is certainly a good idea. It is an index to the books, magazines, and newspapers relating to photography and the kindred arts that are on sale in Great Britain, giving the sale and post free prices. The one now issued is only a first edition, and it is proposed to considerably enlarge it shortly, so that it shall contain practically the whole of the works upon photography published in this country.

387.—**The Principles of a Photographic Lens** (R. & J. Beck).

This is really a little pamphlet published by the well-known lens makers for the benefit of those who, whilst not desiring to enter into theory, do want to get a few general ideas as to the general factors and influences of a photographic lens. As such the work is decidedly useful. It is concise and to the point. By permission of the Messrs. Beck I reproduce one of the blocks, and quote the following extract :—

"It will be observed from examination of the illustration that, as the lens collects a large number of rays from each point in the object and bends them to another point, one particular lens can only form its picture in one plane, and the distance of this plane from the lens is called its focal length. A B represents a lens, C C the object, and E F the inverted image formed. The pinhole would have allowed practically but one direct ray of light from each point in the object to pass through to form the image at E F, but the lens not only allows one direct ray of light through, but the whole bundles or cones of rays A B D, A G B, A C B, and collects them again at the points F, H, E, which will all be found to be practically in one plane at right angles to the axis of lens. It may be noted here, for future reference, that the greater the diameter of the lens A B the larger the



number of rays it must collect from each point in the object, provided the distance of the image E F remains fixed. It will be seen, too, that the plane E F occupies the only position the image can assume, since if it were either further from or nearer to the lens as at J K, a confused mass of rays would result at each point. Therefore, whereas a pinhole has no focus, every lens has a focus, and this forms the first important point in the selection of a lens, as upon the focus of a lens depends—(*a*) The size of the

picture. (*b*) The angle of view included. (*c*) The depth of definition. (*d*) The covering powers of a lens or the sized plate upon which it will give a sharp picture in relation to its rapidity."

388.—**Bromide Paper** (Lund & Co.)

This is a translation by Messrs. Woodbury and Ward of the book by Dr. E. A. Just, who has devoted considerable attention to the subject of contact printing and enlarging. It is a book of 158 pages, with 32 illustrations in the text, a full-page frontispiece on the new Eastman rapid paper, and is certainly the most comprehensive and complete work upon the subject yet issued. In producing such a book at 1/- Messrs. Lund & Co. have shown most commendable enterprise. Everything is so thoroughly dealt with that it is quite out of the question to refer to any one part. One point I should like to mention, however, is the fact that the title only covers part of the subjects dealt with. In the preface by the translators appears the following :—

"This book is a slightly condensed translation of Dr. Just's work, entitled 'Leitfaden für den Positiv-Entwicklungs-process auf Gelatine-Emulsions-Papier mit einem Anhange Die Vergrösserung auf Emulsions-Papier mittelst Projection direct nach Negativen.' It is intended as a guide to the worker with emulsion paper. A word of explanation may be necessary here. The term emulsion paper, much used in this work, refers to a paper coated over with either a silver bromide or a silver chloride gelatine emulsion. In England the name 'bromide paper' is usually given to all papers of this description, some containing bromide of silver only, others a mixture of bromide and chloride, and others silver chloride only. It is clear that to use the term bromide paper for one which contains chloride only is ridiculously erroneous. In this work the two papers are distinguished from each other, and it will be seen that in many cases the treatment varies very considerably. The difference is more clearly explained by the author in that part entitled, 'Differenco between bromide and chloride emulsions.'"

389.—**The Art of Photographing Microscopic Objects** (W. Tylar).

A little pamphlet of eight pages for the instruction of beginners in this somewhat neglected art, really written as a guide in using Mr. Tylar's special apparatus for the purpose.

390.—**The Wet Collodion Process** (Mawson & Swan).

A neatly-printed pamphlet of 44 pages upon "The Wet Collodion Process for Iron Development," a reprint or extract from "Photography Simplified." The instructions are clear and practically put.

391.—**Exposure Note Book** (Mawson & Swan).

A small oblong shape note book, in paper covers, ruled and printed for recording exposures. It should meet with much approval, costing only 3d., and being exceedingly useful.

392.—**"Photographic Enlargements"** (Geo. Wheeler & Co.)

A very complete and practical work upon this subject is in the press at time of writing this. Having seen the proof sheets, however, I think it is one that will be found extremely useful. Many new points are dealt with in an original manner, such as rough *versus* smooth papers, various forms of easels, guiding lines, methods of washing prints, the construction of large dishes, two original methods of enlarging without condensers, condensers from clock face glasses, &c. The whole is profusely illustrated, and the price will be the popular sum of one shilling.



Negative by W. T. Briggs, Birkenhead.

BUCKSKIN BILL.

The Bronze Medal picture in "PHOTOGRAPHY" Portrait Competition, 1891.

PART X.

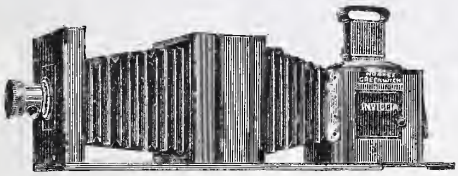
ENLARGING, COPYING, AND REDUCING APPARATUS.

The following were noticed in the "Photographer's Indispensable Handbook":—

Atkinson's	Eastman's	Stereo Company's	Shew's
Dale's	Houghton's	Newton's	Solar

The following were described in "Photography Annual," 1891:—

Adjustable ... ...Griffiths	Daylight ... ...Morgan	Marion's ... ...
Air Brush	Eclipse ... ...Shew	M.T.P. Comb. ...Lancaster
Al Fresco ... ...Wormald	Enlar. Easels ...Morgan	„ Lantern Slide „
Aptus Enlar. ...Sharp	„ Sets ... ... „	Multum-in-Parvo ... „
„ Lan. Slide ... „	Fallowfield's ...	Noakes's ... ...
Atkinson's	Fixed Enlar. ...Griffiths	Optimus ... ...P. S. & R.
Bijou ... ...Hughes	Griffin Cam. ...Griffin	Phœnix ... ...Reynolds
„ (New Pattern) „	„ Lan. ... „	Rect. Condenser ...Hughes
Bromide Pencils ...Lund	Hand-camera Enlar. Fry	Robinson's ... ...
„ „ ...Sharp	Lantern Slide ...Griffiths	Shenstone's ... ...
Cantilever ... ...Hume	„ „ ...Middlemiss	Stereoscopic ...Chadwick
Combination ...Noakes	„ „ ...Pearson's	Swift's ... ...
Copper ... ...Adams	Magnesium ... ...Fallowfield	Wratten's ... ...



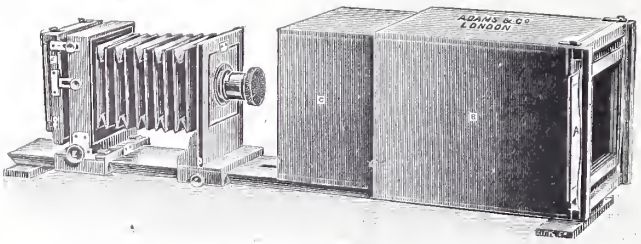
No. 393.

393.—**The "Invicta"** (NOAKES & SON).

A combination enlarging apparatus for artificial light and optical lantern. It consists of an extended base-board, on which is fixed a body carrying the radiant; to this body there is an attachment consisting of a complete lantern front carrying a 4in. condenser. When used for enlarging purposes, the lantern body is connected to a double extending bellows, in which is fitted a compound condenser.

Prices—9in. condenser, ½ plate portrait objective, £14.
12in. „ 1/1 „ „ „ £25.

K K



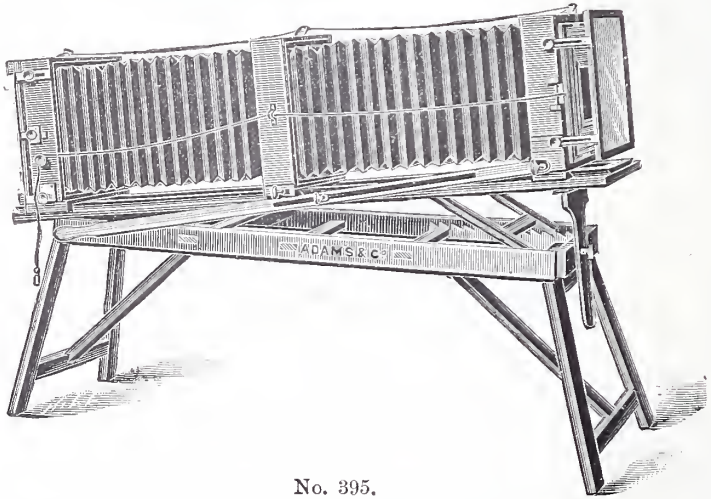
No. 394.

394.—**"Club" Lantern Slide Camera** (Adams & Co.)

It is made of polished mahogany, and has reversing front, with horizontal and vertical movements. This enables the operator to see the view correctly on the ground glass, and also to correct any small error in the negative. The swing back is another most important point, especially to hand camera workers, as by its aid any lines that are out of the perpendicular in the negative may be corrected to a certain extent in the lantern plate. It is made so that it will take equally well customers' own ½ plate or ¼ plate lens. The front portion consists of sliding bodies, which effectually shut out all direct light from the lens, and result in making the slide more brilliant. Rack and pinion adjustment, fitted to back of camera, permits of a fine focus to be obtained without the trouble of sliding the base.

Another point I notice is that the sliding bodies in front are much longer than usual, and nearly cover all the space between the lens and the negative. This helps the brilliancy of the slide.

Prices—½ plate, with ¼ plate carrier £3 3 0
¼ plate, with ½ plate and ¼ plate carriers 3 15 0
12 × 10, with carriers 4 15 0



No. 395.

395.—**The "Club" Enlarging Camera** (Adams & Co.)

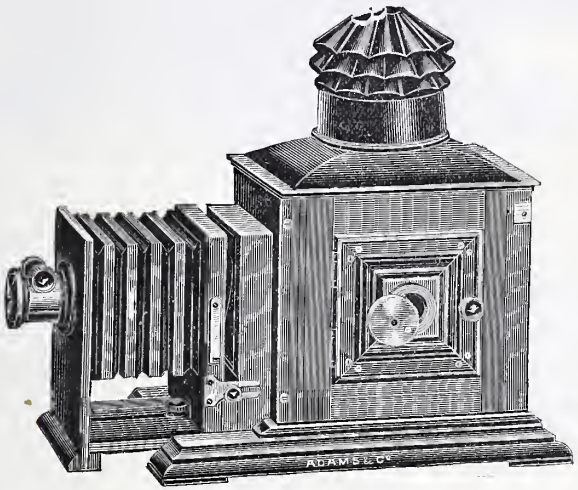
One great difficulty of working with very long extension enlarging cameras is that of altering the negative to the desired position. It

must be done usually by guesswork, comparison upon the focussing screen being made afterwards. In this camera, however, by an ingenious arrangement of cords, the carrier containing the negative may be manipulated from the rear, without removing the head from the focussing cloth, which is a very great convenience. A swing back is another important point in this instrument, and enables the operator to correct errors in the lines of the negative when enlarging or reducing from it. The bellows being detachable, the whole of the front portion may be at once removed, and the remaining portion then becomes an ordinary 15 × 12 studio camera, with swing back, and permits of upright or oblong pictures being taken. Camera is of mahogany, French polished, rack and pinion adjustment to back, best cloth bellows, reversing front, with carriers from ¼ plate upwards and dark slide with carriers to ¼ plate.

Two sizes are made, No. 1 for ¼ pl. to 12 × 10, with an extension of seven feet; and No. 2, for ¼ pl. to 15 × 12, with an extension of nine feet.

Prices—No. 1, £11 11s.; No. 2, £13 13s.

Extra.—Portable folding enlarging table, £4 4s.

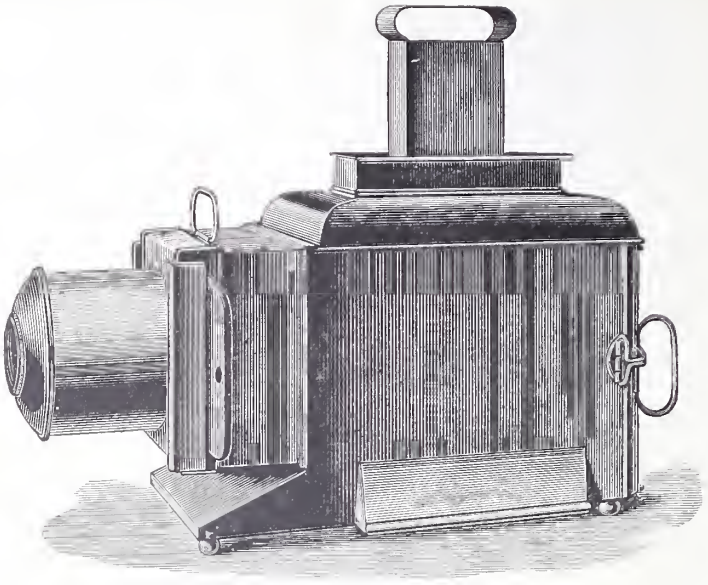


No. 396

396.—**Combined Enlarging and Optical Lantern** (Adams & Co.)

In this a rectangular condenser is used, and as this is of longer focus than the ordinary circular form, it has a flatter field and enables a smaller size to be used, thus reducing the bulk of the apparatus. It has a polished mahogany body with two panelled and moulded doors, lined with japanned tin, sliding tray and rod, lime-light jet, double pinion rack front, with removable 5½in. objective (permitting the insertion of a longer focus lens where required, without alteration to the lantern), the patent rectangular condenser 4½ × 3½, and carriers for lantern and quarter-plates. It is a very efficient apparatus, and much less in size than the usual lanterns for enlarging from quarter-plate. When used for projecting slides on the screen, it resembles exactly an ordinary lantern.

***Price* £12.**



No. 397.

397.—**The "Student's" Enlarging Lantern** (Whittingham & Co.)

A good, simple enlarging lantern for amateurs. It is made in iron and japanned black, and is fitted with two plano-convex condensers and refulgent lamp, front disc of wood, which will take flange of any lens; front lens with rack and pinion movement.

Prices, including necessary carriers—

Size of condenser.	Fully covering	£ s. d.	With lens. £ s. d.
5½ inch.	3¼ × 4¼	3 15 0	4 12 6
8¼ ,,	6½ × 4¾	7 7 0	9 9 0
10½ ,,	8½ × 6½	11 15 0	13 10 0

MORGAN & KIDD,

INVENTORS AND ORIGINAL MANUFACTURERS OF

BROMIDE PAPERS

PRICE LIST of the ARGETIC GELATINO-BROMIDE PAPER.

Size.	1 Doz.	Size.	1 Doz.	½ Doz.	Size.	1 Doz.	½ Doz.
4¼×3¼	6d.	10×8	2/9	—	23×17	12/6	6/9
6½×4¾	1/1	12×10	4/2	—	25×21	18/3	10/-
8 ×5	1/5	12½×10½	4/6	2/9	30×23	24/6	12/6
8½×6½	1/11	15×12	6 9	3/9	30×25	26/-	14/-
		18×15	9/6	5/3			

In Rolls of 20ft., 25 inches wide, 17/6; and 30 inches, 21/- The Positive Paper can also be had with a *rough surface*, same price, but in all cases, unless *rough* is specially ordered, *smooth* is sent.

NOTE.—The Argentic Gelatino-bromide Papers are sent Post Free. SAMPLE SHEET, 23 x 17, 1/6.

MORGAN & KIDD'S

ENLARGEMENTS

By ELECTRIC LIGHT or DAYLIGHT

Are Artistic, Permanent, and Inexpensive,

AND ARE UNEQUALLED FOR BEAUTY OF TONE, DELICACY AND VIGOUR.

MESSRS. MORGAN & KIDD have under their control the largest and best appointed establishment in the world that is devoted to the Production and Finishing of Enlargements and the manufacture of materials for Enlarging, and this advantage enables them to maintain the highest standard of excellence in the execution of the work entrusted to their care.

NEW AND COMPLETE CATALOGUE POST FREE ON APPLICATION.

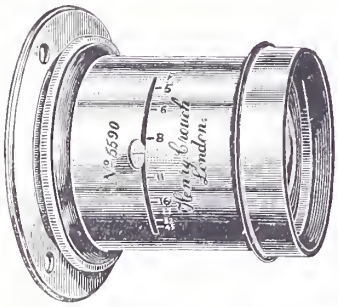
MORGAN & KIDD,

ARGENTIC GELATINO-BROMIDE WORKS,

KEW FOOT ROAD, RICHMOND, LONDON, S.W.

PARIS: 29, BOULEVARD DES ITALIENS. TELEGRAPHIC ADDRESS: ARGENTIC, RICHMOND, SURREY

CROUCH'S LENSES.



Crouch's Rapid Rectilinear Lenses.

Crouch's Wide-angle and Landscape Lenses.

Crouch's Lenses in Aluminium Settings.

Crouch's Special Hand Camera Lenses.

CROUCH'S SPECIAL HAND CAMERA LENS.

Largest Working Aperture f/5.

Focus.	Price with Waterhouse Diaphragms.	Price with Iris Diaphragms.	Price in Aluminium Settings, with Iris Diaphragms.
4½ in.	£2 5 0 ...	£3 0 0 ...	£3 15 0
5 in.	£2 5 0 ...	£3 0 0 ...	£3 15 0
6 in.	£2 10 0 ...	£3 5 0 ...	£4 0 0

Crouch's "Dresser" Hand Camera

(Designed by Mr. A. R. DRESSER)

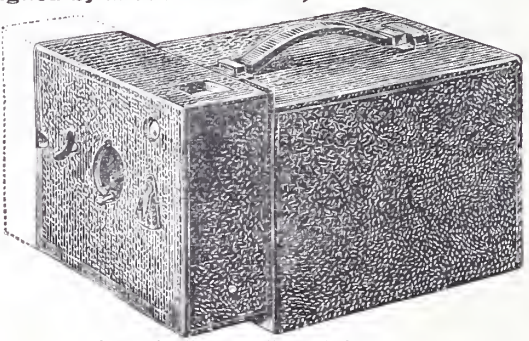
Possesses the following important advantages:

It has rising and cross fronts (patent). The lens is of 5in. focus, largest working aperture f/5. The shutter is the "Dresser" Instantaneous and Time Shutter, working between the lenses and giving exposures from $\frac{1}{100}$th to 3 seconds. The image can be focussed upon a ground glass screen as in an ordinary camera. It carries a roll holder and three double backs.

PRICE £10 10s.

WITH ALUMINIUM FITTINGS:

£12 12s.



Crouch's "Dresser" Hand Camera,
WITH NEW PATENT RISING FRONT.

CROUCH'S "PRESTO" MAGAZINE HAND CAMERA,

To carry 24 plates in sheaths, with instantaneous changing arrangement and time and instantaneous shutter. **Price £6 16s.**

CATALOGUES POST FREE ON APPLICATION.

Hy. CROUCH, Ltd., 141, Oxford Street, W., & 66, Barbican, E.C., London.

SECTION VI.

THE LATEST NOVELTIES

IN

OPTICAL LANTERNS

AND

APPLIANCES RELATING THERETO,

FORMING A CONTINUATION OF AND BRINGING UP TO DATE OF THE INFORMATION CONTAINED IN THE

INDISPENSABLE HANDBOOK TO THE OPTICAL LANTERN AND "PHOTOGRAPHY" ANNUAL, 1891.

COMPILED BY

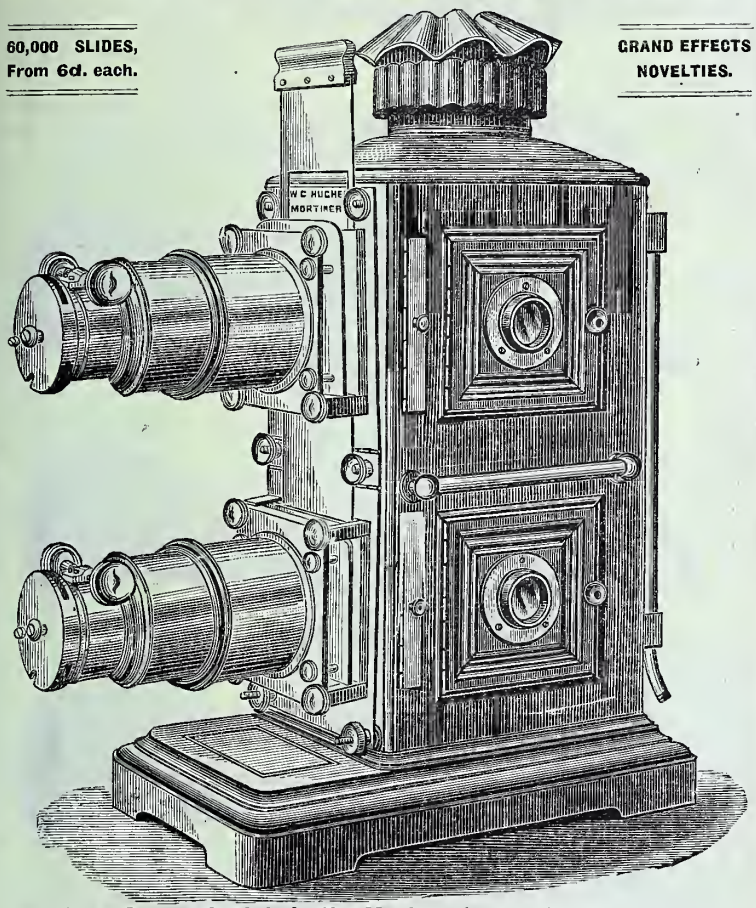
WALTER D. WELFORD

(Editor, "Photographic Review of Reviews").

THE GRAND BIUNIAL LANTERN.

60,000 SLIDES,
From 6d. each.

GRAND EFFECTS
NOVELTIES.



	£	s.	d.
One of the finest Biunials in the Market, elegant, technical, solid, high class, and beautifully constructed, price...	28	10	0
Hughes' Star Excelsior Biunial, handsome solid brass fronts.. ...	14	14	0
Universal Biunial, solid brass fronts	7	15	0
Commercial Biunial, japanned, solid tin fronts, brass flanges, Malden dissolving tap, two limelight jets, complete	7	7	0

The Simplex Dissolving Tap.

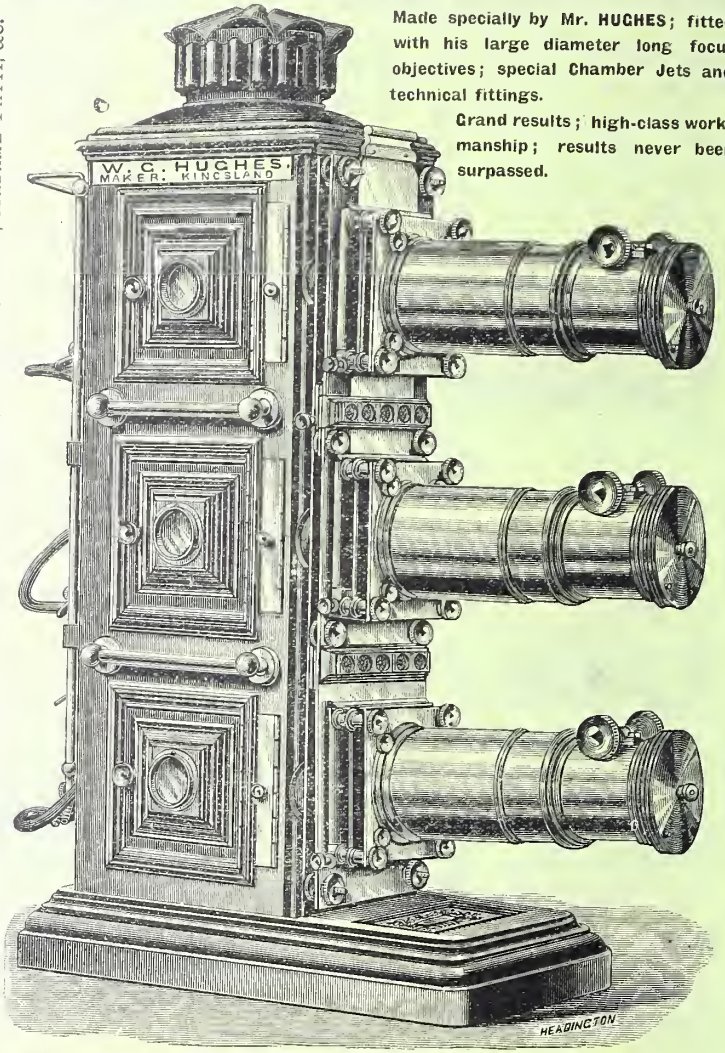
THE SIMPLEX DISSOLVING JET.

The Patent Lever Automatic Gas Regulators are adapted for more accurately regulating the gases in a Triple Lantern. This is a great boon to Exhibitors. Used by COLIN DOCWRA, Esq., MADAME PATTI, &c.

W. C. HUGHES (Patentee), BREWSTER HOUSE, MORTIMER RD., KINGSLAND, LONDON, N.

Mr. Malden's Triple Lantern.

THE DOCWRA TRIPLE gained the only Prize Medal. Used at the Polytechnic Institution. Supplied to Colin Docwra, Esq., Dr. H. Grattan-Guiness, Capt. C. Selwyn, Madame Patti, &c.



Made specially by Mr. HUGHES; fitted with his large diameter long focus objectives; special Chamber Jets and technical fittings.

Grand results; high-class workmanship; results never been surpassed.

THE GRAND TRIPLE SUPERB INSTRUMENT (elegant technical) ...						**£42**	**10**	**0**
THE HIGH-CLASS TRIPLE	...	...	...	...	...	**32**	**10**	**0**
THE EXCELSIOR TRIPLE	...	...	...	...	...	**21**	**10**	**0**
THE UNIVERSAL TRIPLE	...	...	...	...	...	**12**	**12**	**0**

The above instruments have mahogany bodies, solid brass fronts and stages, back supply pipes, and dissolving taps.

The SKELETON PORTABLE TRIPLE; the PORTABLE FOLDING TRIPLE, should be seen.

Full Illustrated Catalogue, over 300 pages, 1/-; postage, 5d.; small ditto, 6d.; postage, 2½d

Pamphlets free.

W. C. HUGHES, Brewster House, Mortimer Road, KINGSLAND, N.



Magic Lanterns

The PORTABLE PAMPHENGOS

Has stood the test for over twelve years against all imitations. Pure white light, steady, and not affected by vibration. Great improvements. Glasses irresistible, compared to limelight, nothing to approach it, collapsible fronts, and rotary focussing.

Price £6 6s., £4 4s., and £2 10s.

The finest Oil-lighted Lantern in the market. Hundreds of Testimonials from the highest authorities.

Cheap Universal Lanterns.

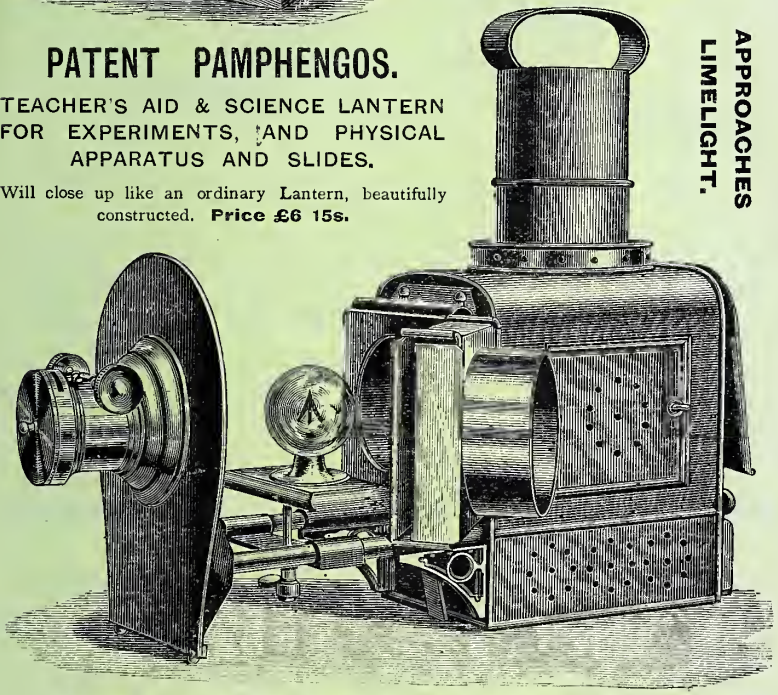
Nicely Japanned bodies, 4in. condensers, 4-wick lamp, double combination front lenses, rack and pinion, **£1 7s. 6d.**

PATENT PAMPHENGOS.

TEACHER'S AID & SCIENCE LANTERN FOR EXPERIMENTS, AND PHYSICAL APPARATUS AND SLIDES.

Will close up like an ordinary Lantern, beautifully constructed. **Price £6 15s.**

APPROACHES LIMELIGHT.



LANTERNS & SLIDES.—50 Slides on hire for 3/-, in special boxes, sent anywhere in the United Kingdom. These are coloured, and good quality

W. C. HUGHES, PATENTEE, Brewster House, Mortimer Rd., Kingsland, **LONDON, N.**

HUGHES' PATENT BIJOU

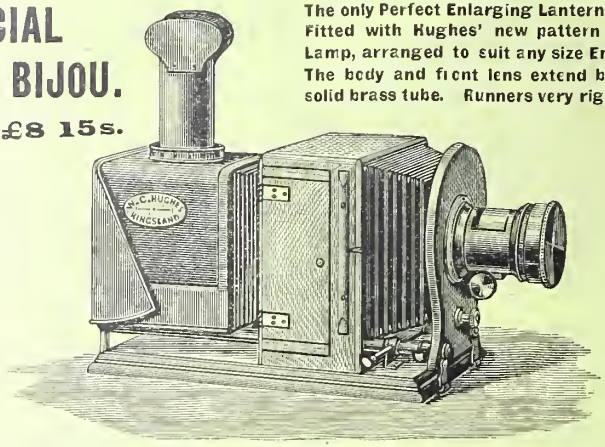
ENLARGING LANTERN

(New Pattern 1892).

PORTABILITY, PERFECTION, AND RAPIDITY.

SPECIAL BIJOU.

5 × 4, **£8 15s.**



The only Perfect Enlarging Lantern for results. Fitted with Hughes' new pattern Triplexicon Lamp, arranged to suit any size Enlargement. The body and front lens extend by means of solid brass tube. Runners very rigid and firm.

NO PHOTOGRAPHER SHOULD BE WITHOUT ONE.

PARTICULARS FREE.

Instead of Circular Condensers, Rectangular or Square, Reduces the Lantern to half its size, and gives finer definition than any other.

Perfect combustion and a pure white light. This Instrument is scientifically considered, and not the common commercial article sold for cheapness.

PRICES:—$8\frac{1}{2} \times 6\frac{1}{2}$, £18 10s.; $6\frac{1}{2} \times 4\frac{3}{4}$, £14 14s.; $4\frac{1}{4} \times 3\frac{1}{4}$, £7 10s.

Messrs. SMITH & Co. have great pleasure in submitting to you a testimonial upholding with the greatest truth that the Rectangular Condensers purchased from you are giving unqualified satisfaction.

ROBERT C. DANS (*for* SMITH & Co.)

PATENT RECTANGULAR CONDENSERS.

$8\frac{1}{2} \times 6\frac{1}{2}$, £7 10s.; $6\frac{1}{2} \times 4\frac{3}{4}$, £5 5s.; $4\frac{1}{4} \times 3\frac{1}{4}$, £2 2s.

CONDENSERS, BEST QUALITY.

$4\frac{1}{2}$in., 21s.; 5in., 25s.; $5\frac{1}{2}$in., 35s.; 6in. 42s.; 7in., 60s.; 8in., 75s.; 9in., 100s.

Before purchasing, see full Illustrated Catalogue of Magic Lanterns and Dissolving Views, the finest and cheapest in the world. Triples, Biunials, Pamphengos, &c. 80,000 Slides, Novelties, and Effects. 300 pages. Price **1s.**, postage **5d.**; smaller ditto **6d.**, postage **2d.** Pamphlets free.

W. C. HUGHES (Patentee), BREWSTER HOUSE, MORTIMER RD., KINGSLAND, **LONDON, N.**

(*See preceding pages.*

TRADE **XL** MARK.

B. J. Edwards & Co.,

THE GROVE, HACKNEY, LONDON.

PLATES, FILMS, PAPER,

DEVELOPERS,

REDUCED IN PRICE.

Edwards's Special Rapid Plates & Films.

(RED LABEL.) Sensitometer No. 24.

For Quick Work in the Studio and INSTANTANEOUS PHOTOGRAPHY.

May be used instead of "Instantaneous" Isochromatic when it is preferred to develop by the ordinary dark-room light.

These Plates and Films will be found invaluable for quick work. They combine with extreme sensitiveness all those good qualities for which our ordinary plates have for so long been justly celebrated.

EDWARDS'S

SPECIAL LANDSCAPE PLATES & FILMS.

(GREEN LABEL.) Sensitometer No. 18.

For Views, Architecture, and all work requiring GREAT LATITUDE IN EXPOSURE, together with PERFECT FREEDOM FROM HALATION.

These are made of uniform medium rapidity, and although quick enough for Drop Shutter work in a bright light, will yield bright and sparkling negatives even with four or five times the correct exposure. They are the easiest of all plates to work.

Edwards's

ISOCHROMATIC

PLATES & FILMS.

(BY ROYAL LETTERS PATENT)

YELLOW LABEL.

"MEDIUM" (Sensitometer about No. 20), for Landscapes and Copying.

"INSTANTANEOUS" (Sensitometer about No. 25), for Studio and Drop-shutter work.

REDUCED IN PRICE.

NEW PRICE LIST OF

EDWARDS'S PLATES & FILMS.

Size.	Doz.	Size.	Doz.	Size.	Doz.	Size.	Doz.
3¼×3¼ inches	1/3	6½×4¾ inches	3/8	8½×6½ inches	6/6	13×8 inches	14/-
4¼×3¼ ,,	1/6	7¼×4¾ ,,	4/6	9 ×7 ,,	8/-	12×10 ,,	16/-
5 ×4 ,,	2/6	7½×5 ,,	5/3	10×8 ,,	10/-	15×12 ,,	24/-
6½×4¼ ,,	3/3	8 ×5 ,,	5/6	12×8 ,,	13/-	Larger sizes to order	

	¼-plate.	5×4	½-plate.	7½×5	¾-plate.	10×8
Cost of Postage on Plates. 1 doz.	4½d.	4½d.	6d.	7½d.	10½d.	1s. 1½d.
Cost of Postage on Plates. 2 ,,	6d.	7½d.	10½d.	1s. 1½d.	1s. 6d.	

Orders value £2 nett delivered free in London.

Orders value £10 nett delivered free in the United Kingdom.

B. J. EDWARDS & CO., The Grove, Hackney, LONDON.

EDWARDS'S

TRADE **XL** MARK.

SENSITISED PAPER.

"The Perfection of Silver Printing."

WILL NOT BLISTER.

Sample Sheets, whole, or in packets cut to any standard size, post free in the United Kingdom,

9d.

SPECIAL TERMS TO USERS OF LARGE QUANTITIES.

Edwards's XL Gold Toning Bath.

This Toning Bath is prepared by a new Formula, which gives rich purple tones. It will be found convenient and economical in use, and can be used successfully for Opals and Transparencies, as well as for prints on albumenised paper.

Two Solutions (Concentrated). Price—Two 4-oz. Bottles in case, with instructions for use 3/2; by Parcels Post, 3/6.

—*—

B. J. EDWARDS & CO.,

The Grove, Hackney, London.

Telegraphic Address: "EXCEL, LONDON."

EDWARDS'S

SPECIAL TRANSPARENCY PLATES

FOR LANTERN SLIDES.

WORK equally well with **Pyro** or **Hydrokinone,** and give **rich warm tones,** or engraving black at will, with **absolutely clear glass** in the high lights. They are sufficiently rapid to use in the camera when reducing from larger negatives, while for contact printing **a few seconds to gas light** is all that is required.

PRICES—$3\frac{1}{4} \times 3\frac{1}{4}$ inches (Lantern size) 1/- per doz.
$6\frac{3}{4}$ $3\frac{1}{4}$,, (Stereo size) 2/9 ,,
Other Sizes same price as Isochromatic Plates.

NOTICE.

Each dozen of these Plates is packed in a special **grooved box,** which can be afterwards used for storing the finished Slides.

B. J. EDWARDS & CO.,
The Grove, Hackney, London.
Telegraphic Address: "EXCEL, LONDON."

SECTION VI.

OPTICAL LANTERNS, ACCESSORY APPARATUS, AND LANTERN SLIDES.

COMPILED BY WALTER D. WELFORD.

INTRODUCTORY.

LANTERNS themselves have undergone but little change during the last season, and there is nothing worthy of special note. I must, however, explain that in all instances where the name of the firm, which usually follows the title, is replaced by the word trade, it signifies that the apparatus is made by a wholesale firm, and retailed by many dealers. As I said last year, the Optical Lantern trade is somewhat different to photography as regards specialities. In the main, most dealers content themselves with selling goods that are not specially their own, although they may tack on distinctive titles. It is quite true that the term "trade" is vague, and not useful as an address for the would-be purchaser. But it would be obviously unfair to place some of these things to the credit of any particular firms or dealers, and the completeness of the work would suffer by their entire exclusion. As the wholesale firms do not desire their names mentioned, it follows that the only course left open is to deal with them as trade articles.

Considerable attention has been devoted to compressed gas apparatus in the direction of pressure gauges, valves and regulators. This has partly been brought about by one or two little accidents that have happened, though I certainly think they received more attention than they deserved.

A new ether saturator is announced, which is placed *inside* the lantern, but it will probably make a commercial appearance next season.

Two slide carriers have appeared, both of which effect a great convenience, viz., the raising of the slide when the frame is pushed home, for removal by the top, thus avoiding soiling of the glass.

Films are making their way as a material for slides to replace glass, and with their use other things are needed and produced. And in the same direction various little aids to the lantern slide maker, masks, binders, printing frames, &c., have made their appearance.

Altogether, however, there is nothing startling to record in Section VI. this year.

WALTER D. WELFORD

BIRMINGHAM, MAY 1ST, 1892.

PART I.

OPTICAL LANTERNS.

SINGLE LANTERNS. BIUNIALS AND TRIPLES. SPECIAL LANTERNS.

SINGLE LANTERNS.

The following were noticed in the "Optical Lantern Indispensable Handbook":—

OIL.

Amateur, The
Cheap Mahogany Body
" Metamorphoser
Co-operative Educational Duplexicon
Co-operative Educational Triplexicon
Co-operative Three and Fourwick
Cuhley's Mineral Oil
Economic, The
Excelsior, The
Exhibition, The
" (Woods)
Guinea, The
Lecturer's, The
Marvel, The
Medland's No. 6
" No. 7
" No. 8
Newton's No. 5
" Phantasmagoria
Noakes's No. 6a
Optimus
"
Ottway's No. 5
" Phantasmagoria
Pexton's No. 1
Phantasmagoria
Phonopticon, The
Pioneer, The
Place's No. 1
Place's No. 2
Popular, The (Archer)
Pumphrey's M
Steward's No. 6
" No. 7
Sunlight, The
Superior Tin
Theohald's No. 6
" No. 7
Triple Wick, The (Catlin)
Victoria, The
Watson's Cheap Phantasmagoria
Appleton's Cheap Mahogany
" Russian Iron
Cyclexicon, The
Euphaneron, The
Helioscopic, The
Hughes's Triplexicon
" " Second Quality
Imperial, The
Invicta, The, No. 1
" " No. 2
Mahogany Body, The
" "
" Photogenic
" Phonopticon
Manchester, The
Medland's Mahogany Body
Metamorphoser, The
Newton's Improved Phantasmagoria
Newton's Mahogany Phantasmagoria
Pamphengos, Second Quality
" The
" The Circulatory
Parisian, The
Pentaphane, The
Perfection, The (Medland)
" " (Tyler)
Pexton's No. 2
" No. 6
Photinus, The
Photogenic, The
Pioneer, The
Place's No. 3
Pumphrey's Na
Sciopticon, The
Russian Iron, The
Special Photogenic
Standard Educational Phonopticon
Sunlight, The
Technical, The
Tylar's Special Russian Iron
Wilson's Phantasmagoria

LIMELIGHT.

Armstrong's No. 1
" No. 2
Best Quality
Institution, The
Miniature, The
Pocket, The
Taylor's Single
Wood's Single

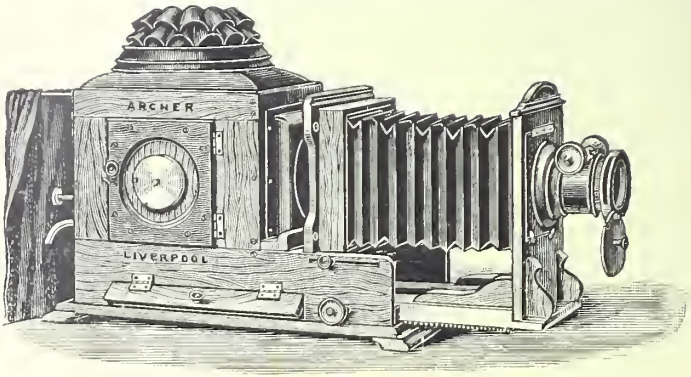
The following were described in "Photography Annual," 1891:—

Cluh ... ...Steward	Institution ... ...Steward	Optimus 50/- ...P. S. & R.
Excelsior ... ...Lancaster	Mansard ... ...Appleton	Perfect ... ...Chadwick
" ... ...Tyler	Optimus 82/- ...P. S. & R.	Praestantia ...Riley
Ideal ... ...Archer	" Student ... "	Pringle-Beard ...Steward
Improved Photogenic..Steward		

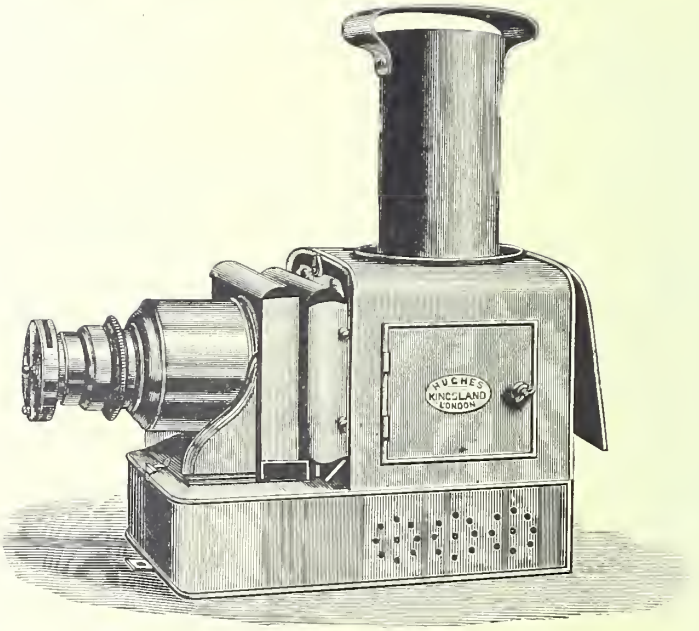
398.—**The "Ideal" Single** (ARCHER & SONS).

A new form of single lantern, with bellows front extending to fourteen inches, focussed by a rack and pinion the entire length, so that interchangeable lenses are used of various foci to give a picture from 6 to 80 feet from screen, or any distance between. Also a loose front board for photographic lenses.

Price, complete in case, £8 15s.



No. 398.



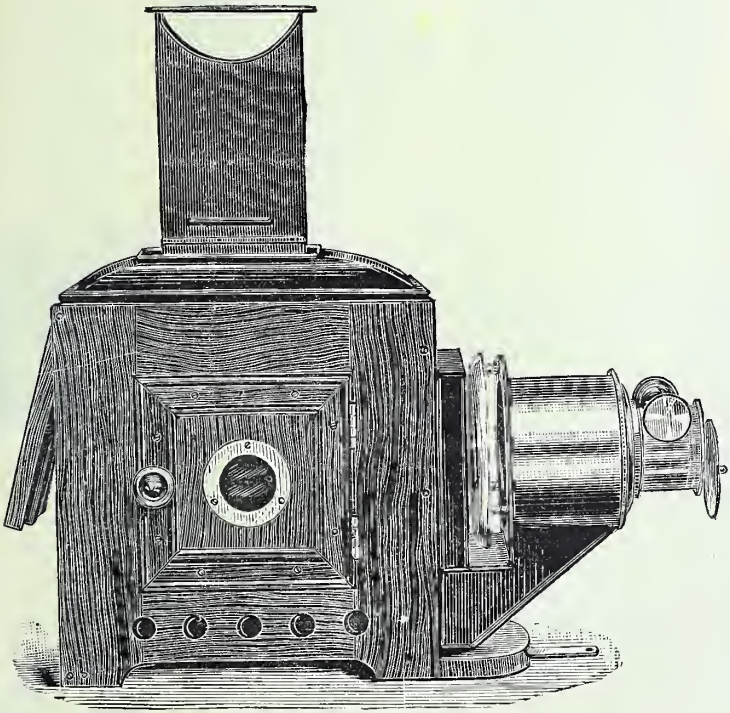
No. 399.

399.—**The "Pamphengos"** (W. C. Hughes).

This season the new Pamphengos is reduced in size considerably, compared to the original design, and yet retaining all its stability. The body is japanned, and has doors both sides. The chimney telescopes, thereby occupying much less space, and by alterations in the hood, cone and chimney, 20 per cent. more light is claimed. The front draw tubes are of brass, which slide in a groove upon foot of lantern body, and held in position by two catches. When packed for travelling, the inner draw tube

telescopes into the outer tube about two inches, and the front lens again slides into the inner draw tube, being really a succession of telescopes (commencing with the front lens) into the body of lantern. The lenses are fitted into tube on which is fixed midway a suitable rack two inches long, and is again encased by an outer tube or jacket, central of same is attached a revolving flange, on which is cut internally a thread, the same fitting into rack on lens tube (acting as a pinion), which upon being revolved by the hand causes the lenses and tube to be driven in or out. The lamp is altered this season whereby a better illuminated disc is claimed. The whole is packed into a polished mahogany stained case with leather strap handle for carrying.

Price £6 6s.

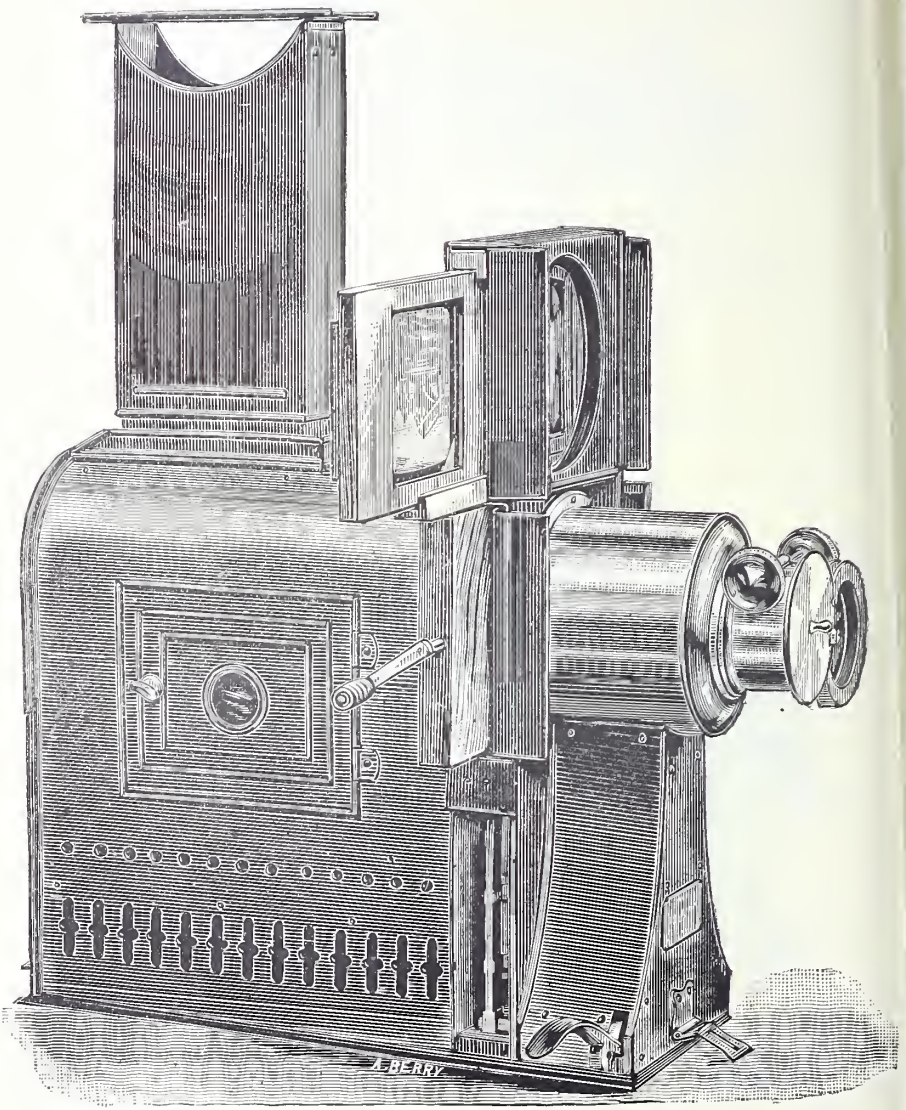


No. 400.

400.—**Mahogany Body Single** (Trade).

This is the same as No. 405, but is superior, having handsome mahogany body, lined with tin.

Price £3 15s.



No. 401.

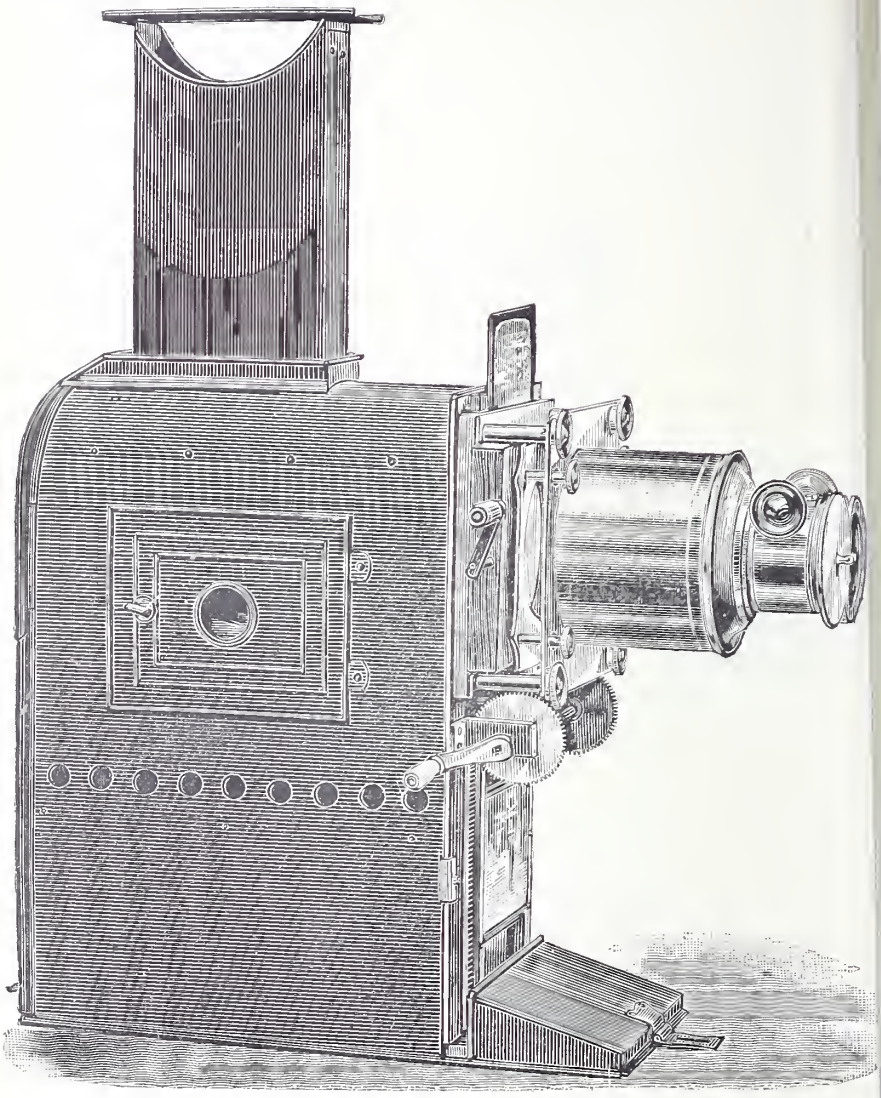
401.—**The "Metamorphoser"** (Trade).

This is an arrangement for showing framed slides, especially, perhaps, those with mechanical movements that usually necessitate the removal of the carrier used for the ordinary unframed slides. By means of a double changing stage, working vertically, any framed slides (such as rackwork, lever action, changing comic, &c.) can be shown with one lantern one after another without any interval, thus doing away with the unsightly appearance of the white disc of light seen on the screen while changing the slides in the stage of an ordinary single lantern. Any mechanical slide can be introduced into a lecture set of photographic slides used with a carrier frame, without taking out the carrier, by simply placing the mechanical slide in the bottom stage, and raising it when required into position, and then lowering the stages again to their former position. The double sliding stage is raised and lowered by a lever which enables the operator to either raise it slowly, so as to make the slides exhibited appear like a panorama, or to raise it so quickly that the change from one slide to another is almost imperceptible. The body of the lantern is made entirely of Russian iron and riveted throughout with copper rivets, and the front tube and sliding O.G. tube of solid brass. There is a door on each side with sight-hole for use with the limelight. It is fitted with a 4in. plano-convex compound condenser in brass cell, and double combination achromatic front lenses, 2in. diameter, $5\frac{1}{4}$in. equivalent focus, in brass mount and double pinions to the rack adjustment, with a sliding shutter or flasher, having a groove to carry shapes of coloured glass for tinting slides. It has also a new four-wick lamp, with wicks 2in. wide (placed to form two wedges, thus W, this preventing the flicker of the wicks, seen on the screen, when they are placed parallel to one another), and a tall, jointed Russian iron chimney, with a large oilcan and filler. The oil can, when not in use, fits into the chimney, and the chimney then slides into the lantern body underneath the lamp, thus making the box in which the lantern is packed as small as possible (size $15 \times 11\frac{1}{2} \times 6$).

Price £5 12s. 6d.

402.—**The "Terpuoscope"** (Trade).

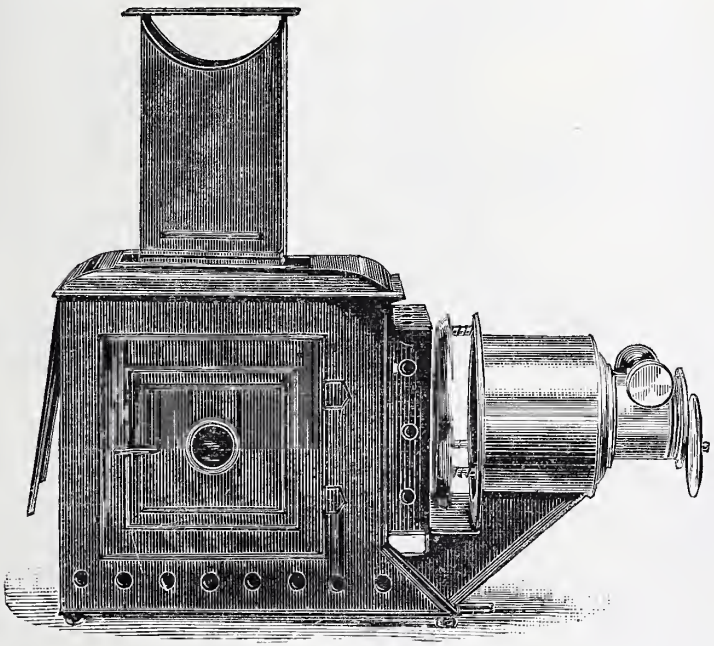
This is the same as No. 401 in all details, but has, in addition, an automatic registering slide carrier and rolling curtain effect, worked by a rack and pinion. The following is a description of this slide carrier:—Before the entertainment commences a photographic slide ($3\frac{1}{4} \times 3\frac{1}{4}$) is placed in the grooves, under the front tubes, and is worked up into its place by the rack and pinion adjustment where it is caught by springs and properly centred ready for exhibition. To commence the entertainment, the curtain is racked down, which has the appearance on the screen of rolling up a black curtain and revealing the first picture or slide of the lecture. While this is being exhibited another photograph is placed in the grooves under the front tubes, and when the change of slide is desired, the rackwork curtain is racked up again, taking with it the second picture (having the appearance on the screen of the black curtain rolling down over the first picture), which exactly takes the place of the first, and is in position for exhibiting, the curtain is again racked down (*i.e.*, the black curtain rolled up on the screen), when the second picture is seen in the same way as the first. This can be continued all through the lecture. Should it be wished during the lecture to introduce a mechanical slide, or any slide, mounted in a frame, the working of it is as follows: After the last photograph has been exhibited, before the mounted slide is required, instead of inserting another photographic slide in the grooves, a dummy slide, made of brass with a blank space in the centre (which is sent with each lantern), is put in and racked up, which takes the place of the last photograph exhibited, while the curtain is up (*i.e.*, down on the screen); the mounted slide is then placed in the ordinary stage of the lantern, and the curtain is racked down



No. 402.

again (*i.e.*, up on the screen), when the mounted slide will come into view. Then, if another photographic slide is required, it is placed in the grooves in the way beforementioned, and racked up into position, taking the place of the dummy slide, and the mounted slide is withdrawn from the stage while the curtain is up (*i.e.*, down on the screen). Mounted slides can also be exhibited one after another with the curtain effect, in the same way as the photographic slides. Should the exhibitor at any time wish to dispense with the rolling curtain, the slides can be exhibited in the ordinary stage of the lantern in the same manner as in other single lanterns. The great advantage of the rolling curtain effect is that between each slide, the screen having been made black for a few seconds by the curtain rolling down, the eyes are relieved from the great glare, and each picture all through the entertainment comes as fresh and bright, and with equal effect to the eyes of the spectators, as the first slide exhibited. The body of this lantern has to be made about an inch higher than the patent lantern, "The Metamorphoser," which at first appears to be a drawback, but in reality it is a great convenience, as there is just space enough under the lamp, at the back of the body, to carry a small Russian iron box, which will hold sixty unmounted photographic slides, and an oilcan and filler large enough for sufficient paraffin oil for a two hours' entertainment. The Russian iron box and the oilcan (with screw stopper) and filler are sent with each lantern. The price includes a stained and French polished case, with lock and key and leather handle.

Price £6 15s.



No. 403.

403.—**Japanned Tin Single** (Trade).

This pattern has been improved by the brass spring plate stage, instead of grooves, for the carrier, which allows of the insertion of slides

from the top as well as at the sides. It also allows the use of chemical experimental apparatus, &c. Another feature is the additional strength given to the front lens and tube by the continuing of the base, as will be seen by the illustration. This lantern is made of japanned tin, with dome shape top, and side door with blue glass sight hole (for use with limelight), japanned tin stage, fitted with brass spring plate with brass bolts, and open at top for chemical experiments. The front tube and sliding O.G tube are made entirely of brass, the lantern is fitted with a three-wick improved shape Russian iron paraffin lamp, with jointed Russian iron chimney, and a 4in. plano-convex compound condenser in brass cell, and double combination achromatic front lenses, 2in. diameter, 5¼in. equivalent focus, in brass mount, with double pinions to the rack adjustment, and fitted with sliding shutter or flasher. Fitted in a stained and polished wood case with hooks and eyes and handle.

Price—£2 10s.

BIUNIALS AND TRIPLES.

The following were noticed in the "Optical Lantern Indispensable Handhook":—

OIL LANTERNS IN PAIRS.

Cheap Mahogany
" Tin
Colza Oil Pattern
Combined Side by Side and Biunial
Co-operative Educational Duplexicon
Co-operative Educational Triplexicon
Co-operative Three and Four-wick
Cuhley & Preston's Mineral Oil
Cyclexicon, The
Euphaneron, The
Excelsior, The
Guinea, The
Helioscopic Oil Biunial
Hughes's Triplexicon
" " Second Quality
Imperial, The
Invicta, No. 1
" No. 2
Lecturer's, The
Mahogany Photogenic, The
Medland s Mahogany Body
Newton's Improved Phantasmagoria
Newton's Mahogany Phantasmagoria
Optimus, The
Pamphengos
" Second Quality
Perfection, The (Medland)
" The (Tylar)
Pexton's
Phonopticon
" Mahogany
Photinus, The
Photogenic, The
Place's No. 3
Popular, The
Pumphrey's No. M
Russian Iron
Sciopticon, The
Standard Educational Phonopticon
Sunlight, The
Superior Mahogany
" Tin
Tylar's Special Russian Iron
Victoria, The
Watson's Cheap Phantasmagoria
Watson's Phantasmagoria

BIUNIALS.

Archer's No. 1
" No. 2
" No. 3
" No. 4
Banks's Combination
Bi-cylindrical
Blakeborough's Mahogany
" "
Catlin's No. 1
" Superior
Chatham, The
Co-operative, The
C.P.S, The
Excelsior, The
" Star, The
Exhibition, The
Grand, The
Hughes's Star
Lecturer's Standard
" The (Ottway's)
" The (Wood's)
Luke, The
Mason's No. 1
" No. 2
" No. 3
Medland's Iron Body
" Mahogany Body
" Superior
Newton's Combination
Newton's Ebonised & Nickel-plated
Newton's Japanned Tin
" Mahogany
" "
" Superior
Noakes, The, No. 1
" No. 2
" No. 3
No. 1, The
No. 2, The
No. 3, The
Optimus Combination, The
" The
Pexton's Mahogany Body
Place's
School, The
Standard, The
Steward's Mahogany Body
" Portable Standard
" Standard
" Superior Mahogany
Taylor's
Triple Rack
Watson's High-class
" Mahogany
" Superior
" Tin
Wilkinson's No. 1
" No. 2
" No. 3
Wood's

TRIPLES.

Appleton's
Archer's Grand
" No. 1
" No. 2
" No. 3
Armstrong's
Banks's
Bijou, The
Brideman No. 1
" No. 2

TRIPLES—*continued.*

Catlin's No. 1
" No. 2
Chatham, The
C.P.S., The, No. 1
" No. 2
Docwra. The
Excelsior Co-operative, The
" The
Grand, The
Lecturer's, The
Malden, The
Medland's No. 1
" No. 2
" No. 3
Newton's
"
Noakes's No. 1
" No. 2
" The
No. 1, The
No. 2, The
No. 3, The
Optimus The
Ottway's High Class
" No. 1
Registered Bridgman
Steward's Portable
Triple Rack, The
Tylar's High-class
Tylar's No. 1
Watson's No. 1
" No 2
" No. 3
Wilkinson's High-class
1886 Pattern, The
Noakes's F.L. and Mount
Ottway's
Single Achromatic
Steward's Achromatic
Taylor's English Portrait
Theobald's Cheap
Triple Rack
" " Telescopic (Mason's)

The following were described in "Photography Annual," 1891:—

Appleton's Triple ...
Lancaster's Biunial...
Lancaster's Triple ...
Malden, 1891 ... ...Hughes
Perfect Biunial ...Steward
Perfect Triple ... "
Portable Triple ...Steward
Premier " ... "
Skeleton " ...Hughes

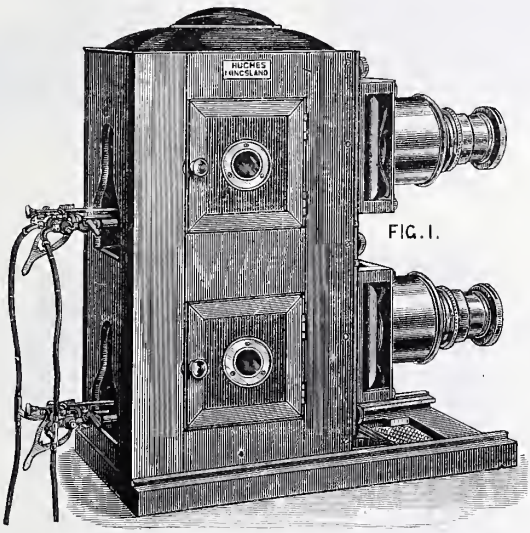


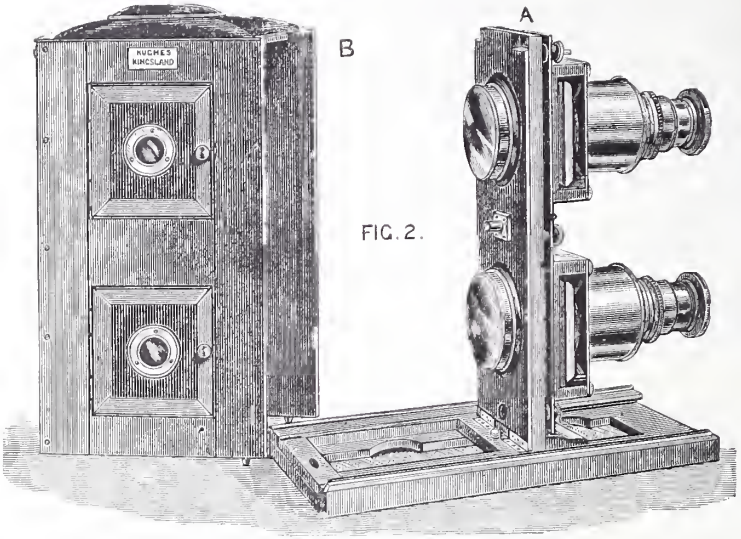
FIG. 1.

No. 404. Fig. 1.

404.—**The Folding Biunial** (W. C. HUGHES).

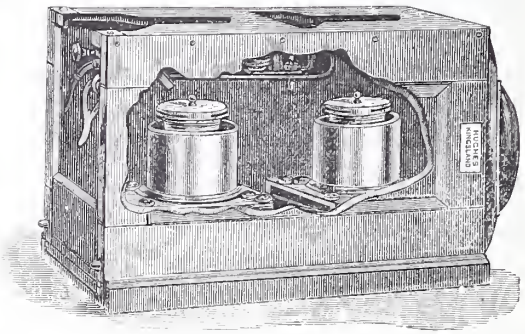
This is a biunial lantern especially designed to fold up into a small space for travelling or packing purposes. It is so constructed as to be made to collapse and fold up into the smallest compass possible, after the manner of an ordinary portmanteau or handbag. Fig. 1 shows the lantern in biunial form complete and set up for use.

The body, fig. 2, is of polished mahogany lined with iron, and easily removed from the mahogany base board and vertical front supporting the brass stages and optical systems. This latter is hinged to a small mahogany frame running longitudinally in a larger one, virtually the foot of the lantern itself; by sliding this forward it is capable of folding up, or lying flat upon the said foot, or can be raised to a vertical position when required, as fig. 2 A. The jets and dissolvers are maintained by brass brackets, which slip on and off for the purpose of packing.



No. 404. Fig. 2.

FIG. 3.



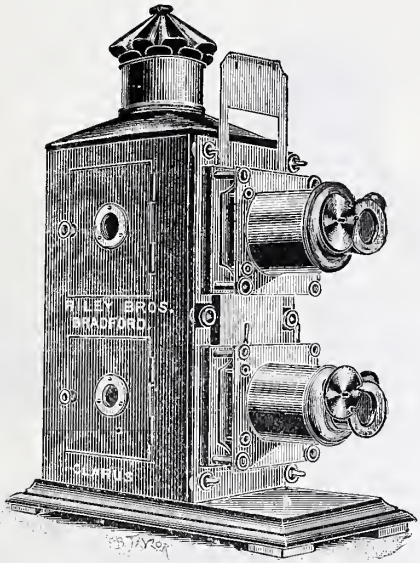
No. 404. Fig. 3.

The front lenses are mounted for focussing on the principle which dispenses with the ordinary rack and pinions and double milled heads. The in and out motion is obtained by means of a rotary flange, which operates when revolving upon a rack flange in such a delicate manner as to act really as a fine adjustment. This, together with inner tube made to collapse or telescope inside the outer one, allows room for everything, brackets, trays, jets, dissolving taps, etc., to be packed comfortably inside the lantern body itself, as shown in fig. 3.

Price £16 16s.

405.—The "Superb" Extra (Riley Bros.)

A handsome lantern with many conveniences, and at a price within the reach of all. Details are:—Body of polished mahogany, moulded foot,



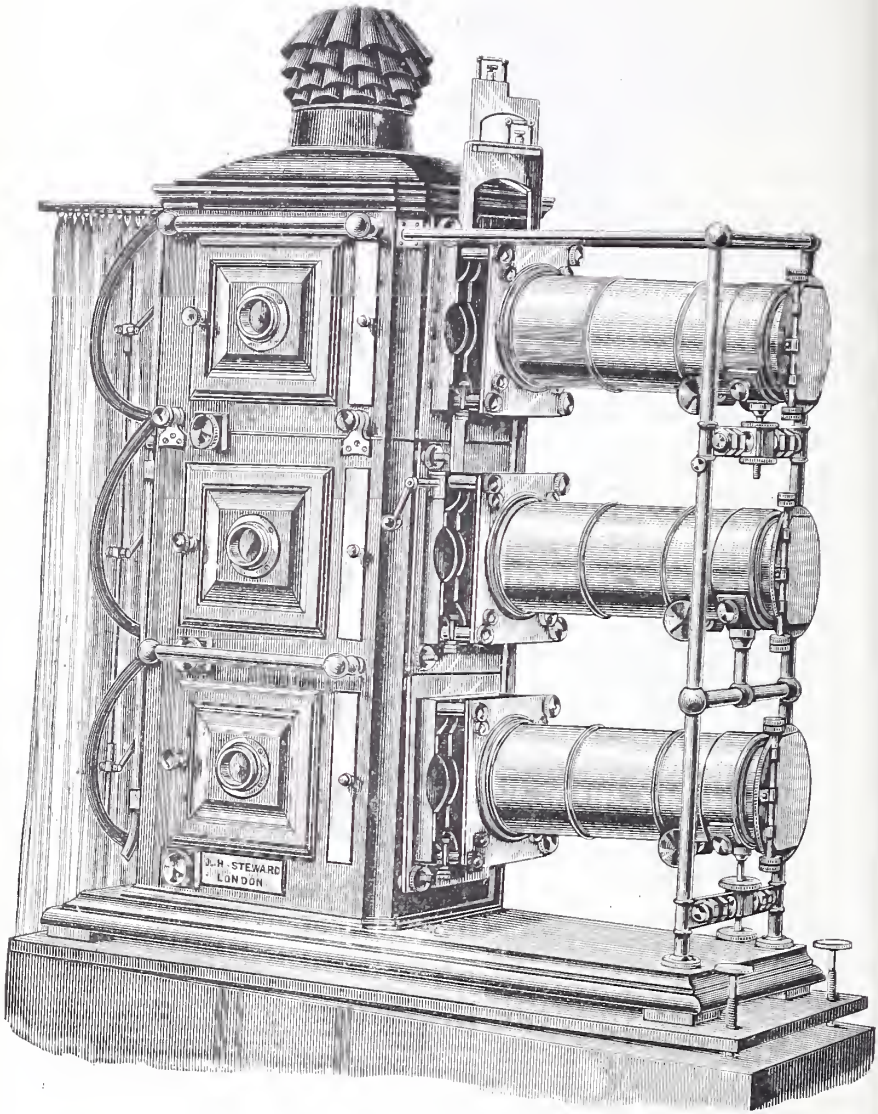
No. 405.

four panelled doors. Brass rail handles on each side. Stages and front tubes entirely of brass. Brass rolling curtain effect. Brass-bound sight-holes with sliding caps. Four-inch condensers in brass cells. Large size double achromatic front lenses in brass mounts. Large size lenses to the back combination. Double rack and pinion adjustment, with sliding flashers. The body is lined with japanned tin. The trays for holding the jets are of brass, with improved supports for keeping the same in position. Each lantern has three brass telescopic draws extending to 12 inches, and two sets double combination achromatic lenses, in separate brass cylinders. Each cylinder is fitted with a flashing shutter, with grooves to carry tinting glasses, and has the focal length engraved on it. In the price is included jets, dissolver, tubing and case.

Price £16 16s.

406.—**The Improved "Premier" Triple** (J. H. Steward).

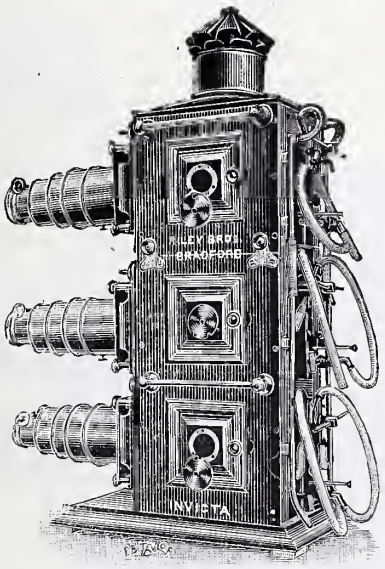
The 1892 pattern possesses points of advantage over the first one introduced, the rack bars being done away with, and in their place is substituted a new method of adjustment for the fronts, by which vertical and lateral movement is readily obtained by the fittings attached to the crossbars. The screwed nuts release and clamp up as desired, and the ordinary screws of the hinged plates being releasd, the front of top or bottom lantern will follow the inclination given by the adjusting screws. The brass tubes are solid instead of telescopic, and the large diameter permits of any focus of lens being used, provided they are fitted in tubes of the right length for the front to be about in focus when pushed home. The necessary exact focussing can be obtained by the rack and pinion. The curtain shutter is provided with double slides, so that the picture or curtain can be rolled up



No. 406.

in either the middle or top lantern, and yet never need be taken out of the lantern. The jets are of the improved Premier form with conical nozzles, and a rackwork is provided to the trays so that they can be adjusted by milled heads fitted outside the body, as shown in the illustration. The registering runners and stops are of the new kind invented by Sir David Solomons, for whom the first of these triples was built.

Price £150



No. 407.

407.—The "Invicta" Triple (Riley Bros.)

A good lantern at a very moderate price. Details are as follows:—Polished mahogany body with moulded foot, six panelled doors with brass-bound sight holes, and brass rail handles on each side to the biunial portion and also to the top lantern, lined with japanned tin with brass trays with double supports, and binding screws for fixing the jets firmly, with japanned tin dome, and rose top and stages and front tubes made entirely of brass, brass rolling curtain effect. Fitted with three telescopic draws (as illustration), extending to 12 inches, and with two sets double combination achromatic lenses in separate brass cylinders. Each cylinder is fitted with a new-shape hinged instantaneous shutter, having grooves to carry slides of coloured glass for tinting, and has the focal length (6, 8, 10 or 12in. focus, as ordered) engraved on it. The cylinders can be changed without unscrewing the front from the nozzle of the lantern. The lantern has double pinions to the rack adjustment. It is fitted with brass tube supply pipes for connecting the gases to the dissolving taps. The top lantern is made to detach, and an extra moulded foot is supplied so that the lantern can be used as a single lantern, a biunial or a triunial.

Price £28.

Extra—Paraffin oil lamp, £1.

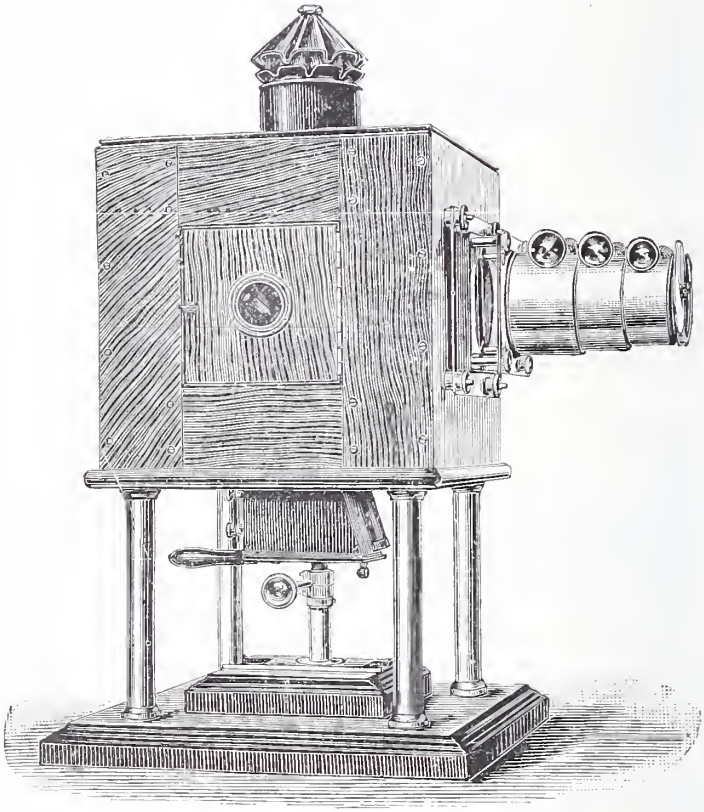
SPECIAL LANTERNS.

The following appeared in the "Optical Lantern Indispensable Handbook":—

Combination Scientist, The (Hughes's)
Electric Scientific (Newton's)
Experimental (Newton's)
Gilchrist Educational, The (Hughes's)
Illuminating Lantern (Wood's)
Light Box (Dale's)
Microscope, The (Hughes's)
Microscope (Wright and Newton's)
Projection (Wood's)
Scenic Lantern (Dale's)
Scientific and Experimenta Lantern No. 1 (Hughes's)
Scientific and Experimental Lantern No. 2 (Hughes's)

The following were described in "Photography Annual," 1891:—

Cantilever ... ...Hume
Electric ... ...Steward
Helioscopic Science ...Tylar
Pamphengos Science...Hughes
Scientific ... ...Archer
Universal Scientific. .Middlemiss



No. 408.

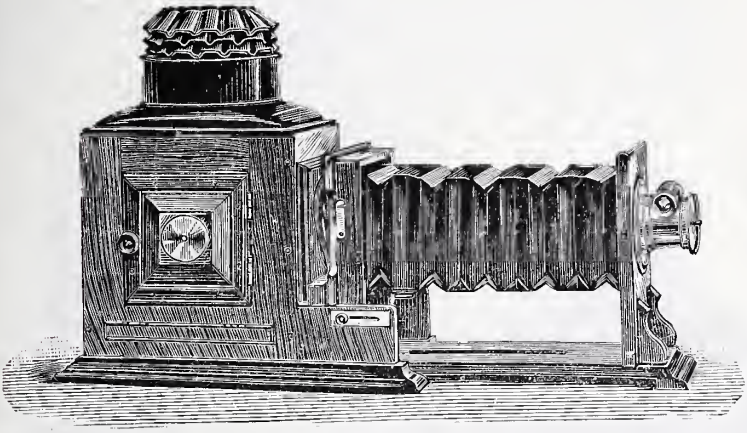
408.—**Electric Lantern** (Trade).

Square polished mahogany body, mounted on four brass pillars and solid baseboard, with three doors fitted with brass-bound sight-holes, lined with japanned tin, with japanned tin rose top.

This lantern is fitted with an all brass stage, fitted with large size (patent) triple-rack telescopic front tubes, and four large size cylinders, carrying best quality double combination achromatic large size front lenses. The condenser is plano-convex and meniscus.

It is fitted with a self-focussing Brockley Pell arc lamp of 2,500 candle power, made specially for optical projection, which can be worked well from a dynamo machine or from accumulators, and is fitted with a regulator for adjusting lamp for currents from 6 to 20 ampères.

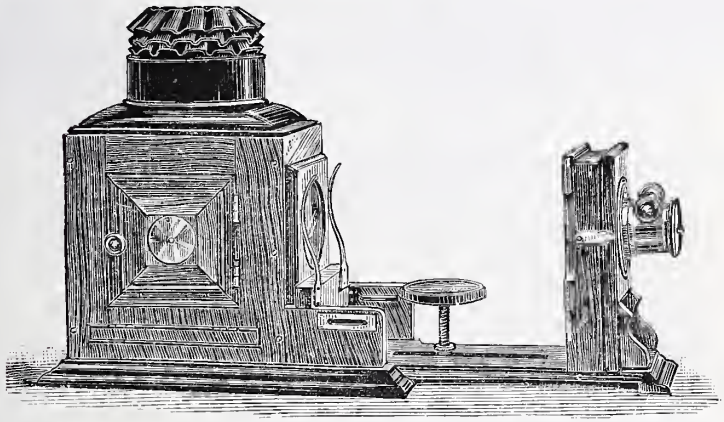
Price £65.



No. 409. Fig. 1.

409.—**Combined Optical and Science Single** (Trade).

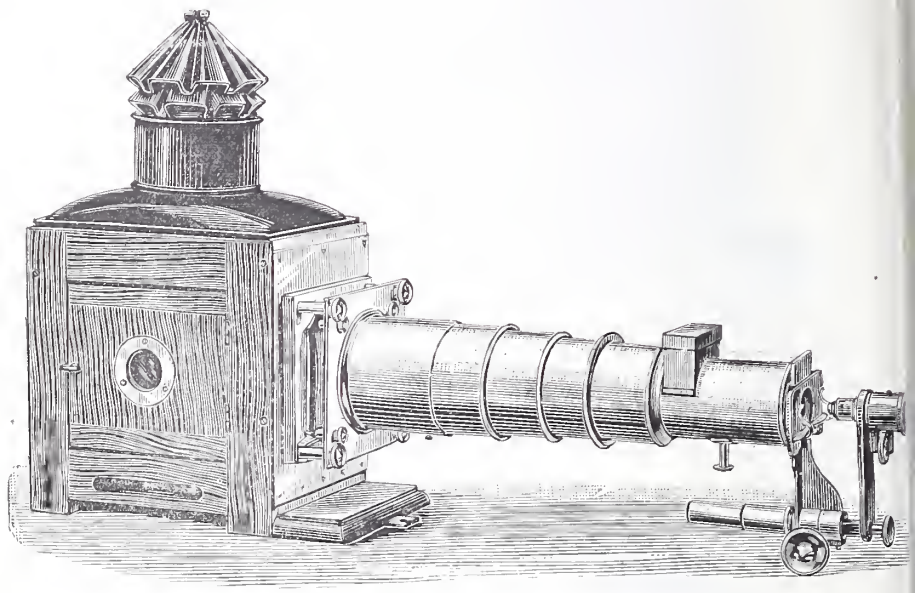
This is of use either for slides in the ordinary way, or as a scientific lantern for experiments. By a very simple arrangement, the leather extending bellows can be done away with, and with a small portable table fitted on, it is ready for any special work. This will be seen by fig. 2.



No. 409. Fig. 2.

Other details are:—Polished mahogany body, with moulded foot and two panelled and moulded doors, brass-bound sight-holes, with sliding shutters, lined with japanned tin, with sliding tray and rod, japanned tin dome and rose top. This lantern has a sliding front foot with an upright to carry the objective, and is fitted with leather bellows, which can be drawn out sufficiently far to use 12¼ inch equivalent focus front lenses. It can be used for any other shorter focus front lens by regulating the length of the bellows to suit the focusrequired. The upright on the front foot is fitted with a nest of three brass adapters, so that any desired objectives can be fitted to the lantern at any time without alteration. There is no objective sent with this lantern, but it is fitted with a 4 inch diameter plano-convex and meniscus compound condenser, mounted in brass cell. The lantern is arranged to take a 3 or 4-wick paraffin lamp when the limelight is not required.

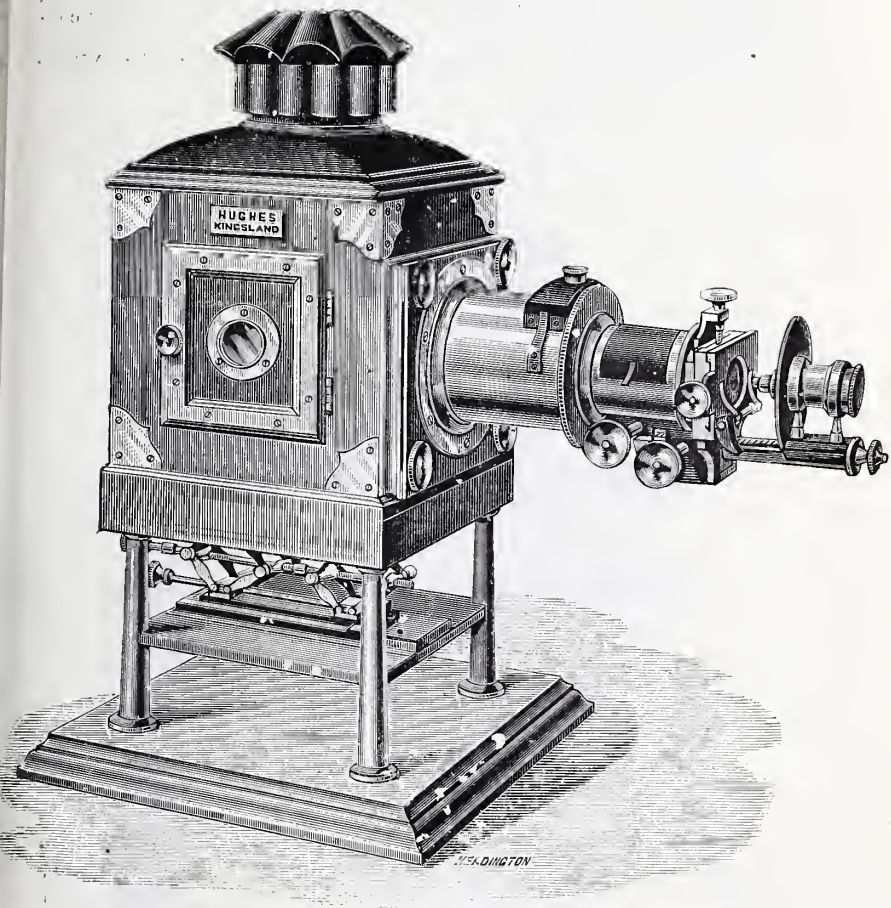
Price £6 15s.



No. 410.

410.—**Cornell's Projecting Microscope** (Trade).

This lantern is fitted with Cornell's projecting microscope with coarse and fine adjustments, complete with alum trough, one substage condenser, and three small substage condensers fitted in a revolving diaphragm, and a 1in. compound objective. With the oxy-hydrogen light (mixed gas jet), this microscope is said to give a brilliantly illuminated disc 15ft. diameter at a distance of 50 feet from the screen, and with a four-wick patent paraffin lamp, a very good five feet disc can be obtained at 10 feet from the screen. The lantern proper has polished mahogany body with a door on each side, lined with japanned tin, with japanned tin dome and rose top. Brass stage and front tube and three brass telescopic draws. Fitted with a 4in. diameter plano-convex compound condenser in brass cell, and double pinion rack front, with four brass cylinders fitted with sliding shutters or flashers (having grooves to carry shapes of coloured glass for tinting slides),



No. 411.

fitted with double combination achromatic lenses 2in. diameter, of the following focii: —No. 1 cylinder, 5¼in. equivalent focus; No. 2, 8in.; No. 3, 9¾in.; No. 4, 12½in. Each cylinder has its focal length engraved on it.

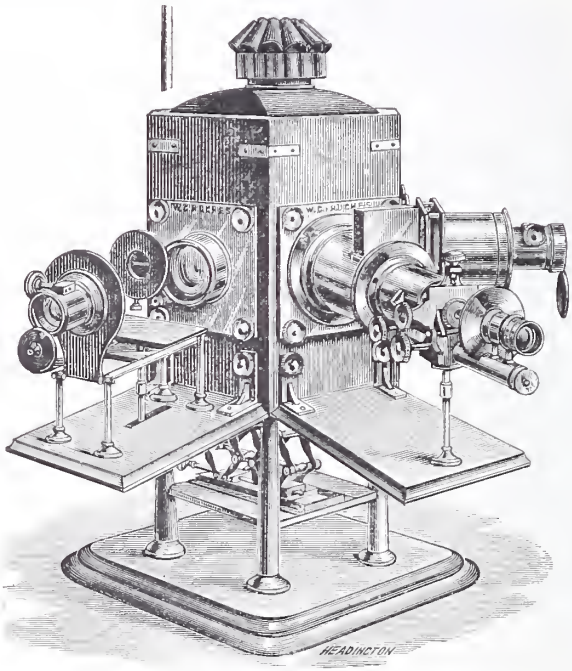
Price—Lantern, complete, £18; microscope attachment only, £7 7s.

411.—Hughes's New Electric Lantern (W. C. Hughes).

For use as microscope and micro-polariscope, fitted with Mr. Hughes's patent 5in. triplet condensers, the back lens to remove when the oxyhydrogen light is used instead of electric lamp. This instrument is superbly constructed, and has every improvement.

Price, electric lantern microscope as above, including Brockley Pell arc lantern lamp, £70.

Extra—Fitted with micro-polariscope, £25.



No. 412.

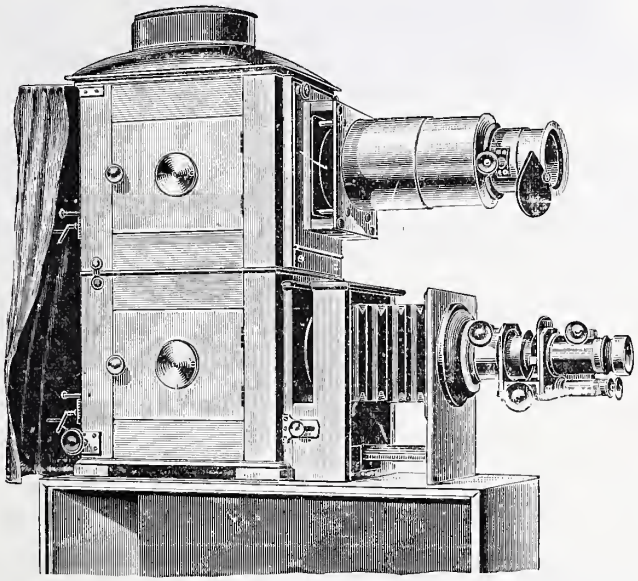
412. "Combination Scientist" Lantern (W. C. Hughes).

This is the one referred to on page 129, "Optical Lantern Indispensable Handbook," but it has been altered in many ways. The inventor in this lantern has striven to supply a want long felt by the professional lecturer, both in the class-room and in the theatre, namely, that of rapidly throwing upon the screen the general view of an object, the microscopic portion of the same enlarged, and in the matter of chemistry and physics, the experiment in actual operation. The body of the lantern, which is of handsome construction, is of hexagon shape, revolving upon a handsome mahogany base board, 3 feet square, with broad moulding round; thus giving a bold and solid effect. The revolving motion is obtained by means of metal rollers, and the counterpoise also with roller action is so constructed that the

balance of points is equalised and in no position is there any undue strain, owing to front weight, and the motion obtained is free but steady. By means of a spring click each front of the body carrying a piece of apparatus is registered upon the screw, true both with regard to the illuminant and the object projected. The body is lined with Russian iron with arrangement for ventilating in a novel but perfect manner. The different uses to which this lantern may be applied are many, but Mr. W. C. Hughes has fitted it with three sets of apparatus which will prove, with the aid of the spectrum slide also fitted, to give a range for demonstrating purposes that will embrace most experiments that are required for class lecturing in light, heat, chemical and microscopical sciences, as well as general views and diagrams. The first slide is fitted with a "Gilchrist demonstrating lantern," and upon the condensers of which is fitted a best form of adjustable spectre slide, which is removable without becoming detached, enabling the decomposition of white light to show on the screen, and most of the experiments of the spectrum. The second side carries a microscopic attachment. The third side is fitted with a superior optical lantern, with a special front lens of large diameter. The illuminist is either the oxy-hydrogen light or the electric light. Arrangements can be made to carry both if required, but all lanterns are fitted with the lime light. If electric light is to be used one of Brockley Pell's arc lamps of any candle power can be adopted, but intimation must be given in ordering, as the lantern body requires to be larger in this case. A new traversing table has recently been added which gives very steady motion to the arc lamp.

Price—With oxy-hydrogen jet £105 0 0

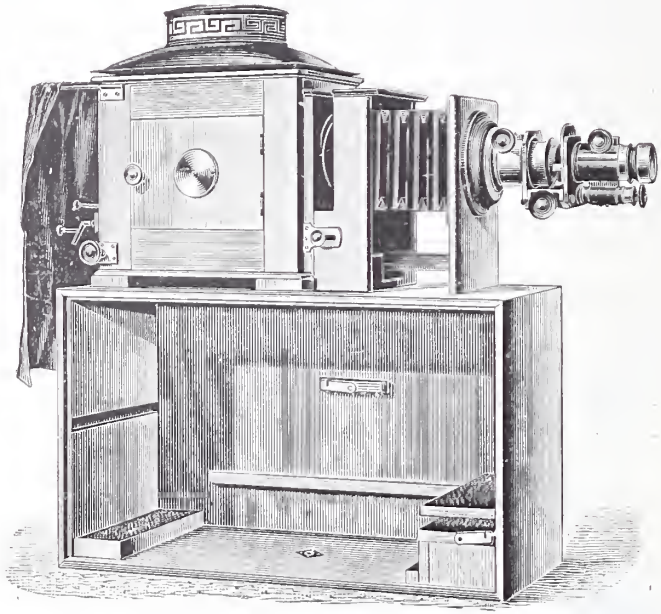
Extras – Brockley Pell electric light £15 15 0



No. 413.

413.—**The "Perfect" Biunial** (W. I. Chadwick).

A combination of the "Perfect" (see No. 414) with an ordinary top lantern. It is intended for dissolving views, or for ordinary slide projection by the top lantern, and microscope projection by the bottom one, scientific experiments, &c.



No. 414.

414.—**The "Perfect" with Microscope Attachment** (W. I. Chadwick).

This is the same lantern as that described on page 624, Phot. An. 1891, but is now arranged for the well-known Leach lantern microscope.

Price £9.

PART II.

ACCESSORIES TO LANTERNS.

SCIENTIFIC AND OTHER ACCESSORIES. EXHIBITION APPARATUS. GAS AND ILLUMINATING APPARATUS.

SCIENTIFIC AND OTHER ACCESSORIES.

The following were noticed in the "Optical Lantern Indispensable Handbook":—

SCIENTIFIC.

nimalculæ Tank
Aphengescope
Chemical Tank
Electrical Decomposing Trough
Kaleidoscope
Lewis Wright's Optical Front
Microscope, Ordinary
Microscopic Attachment
" " (Hughes's)
" " (Mason's)
" " (Newton's)
" " (Watson's)
Polariscope Accessories
Polariscope, Elbow
" Nickel Prism
Prisms, Erecting
Vertical Apparatus (Hughes's)
Vertical Attachment (Steward's)
Various Accessories for Experimental Lanterns
Various Accessories for Microscopical Lanterns

CONDENSERS.

Compound
Dale's Illuminating
Newton's
Ottway's
Theobald's Cheap

CURTAIN DIAPHRAGMS.

For Pair of Lanterns
Rack and Pinion

OBJECTIVES.

Double Combination
Double Rack, The
Hughes's
Hughes's Long-distance Interchangeable, The
Newton's

CABINETS AND CASES.

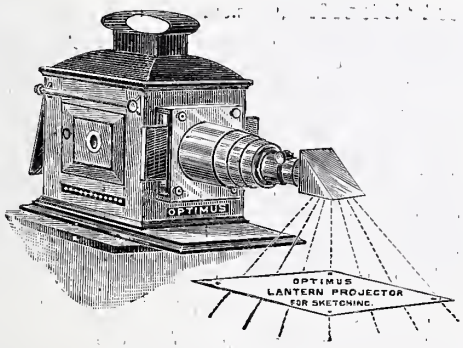
Mason's
Noakes's Triple
Ottway's
Pexton's
Sciopticon

TRIPODS AND STANDS.

Bi-dissolving Stand for Oil
Hughes's No. 1
" No. 2
Portable Brass
Pumphrey's
Revolving and Canting Table

The following were described in "Photography Annual," 1891:—

Leach Microscope ... ...Chadwick
Lenses and Condensers ... ...Dallmeyer
Curtain Diaphragm ... ...Hughes
Microscope ... ...P. S. & R.
Objective ... ...Taylor
Optical Pointer ... .Steward
Siemen's Arc Lamp... ... ... "



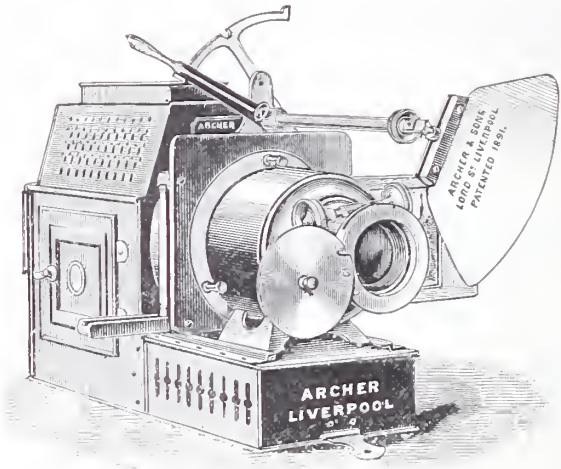
No. 415.

415.—The "Optimus" Projector (PERKEN, SON AND RAYMENT).

The cry is now, "Art, I love thee; Art, I adore thee," because almost everyone is compelled to at least profess art to be his recreation or business,

or be considered an outsider. This apparatus consists of an attachment to the ordinary lantern, whereby an enlarged image is thrown down upon a sheet of paper or canvas, and there sketched. The projector is not only for artists, architects, etc., but for photographers and others who desire to hang something upon their walls beside plain photographs to which they can point with pride as their "hand" work. The transparency or sketch (which may be a paper print, sufficient light passing through even when not rendered translucent) is placed in the carrier, the focus adjusted, and all is ready to trace the outlines of the subject upon the material beneath, the picture being afterwards finished as desired, in oil, water-colour, pencil, ink or crayon. The projector is a very useful tool for anyone, and will, no doubt, be thoroughly appreciated.

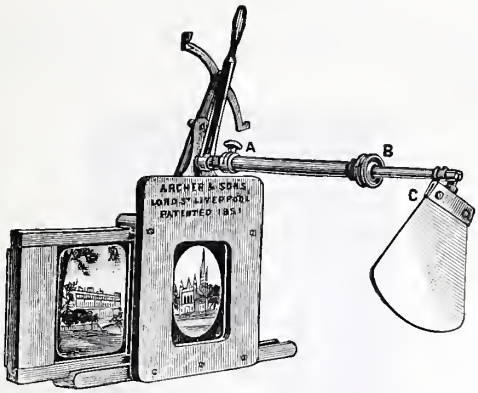
Price, with lantern, £8.



No. 416. Fig. 1.

416.—**The "Ideal" Dissolver** (Archer & Sons).

This was shadowed forth on page 661, Phot. An., 1891, but now it is really on the market. I have nothing but praise for it, though I confess the idea is not new. But placing it commercially upon the market certainly is, and, as Messrs. Archer issue it, it is ready and complete for almost any lantern. At all events, for lanterns having an open top slide stage. It is fitted in the place of the ordinary carrier, as shown in fig. 1, and the only necessary movement is that of moving the arm across, instead of pushing the carrier. The following description may help to a correct understanding of its movements. The dissolver is sent out in two parts for convenience in packing. These are put together by attaching at A. See illustration. The dissolver is then put in the lantern in the place of a slide frame, and the fan C bent down to come in front of the lens. The rod holding the fan is then drawn out (or pushed in) until the fan just clears the lens—the closer to the lens the better. Push the lever handle over to the far side, and see that the edge of the fan only *just clears* the side of the lens. When the handle is pulled, the fan will cross the lens, and just clear the other side. Lock it in this position by the screw B (which also locks the length of the rod). The slides may now be put in and exhibited. The adjustable clips underneath the frame are to lock it in position, central with the lenses. The fan C may be either of ground glass or celluloid, the latter being



No. 416. Fig. 2.

unbreakable. The frame should be held firm by placing the finger on top, while pulling the handle, or fastened with the catches firmly. It is an excellent thing for those who prefer to work a single lantern. The attachment need not be removed, even if desired to work the double carrier in the ordinary way, because the arm is certainly easier and more comfortable to manipulate than the edge of the carrier. Lastly, it is not expensive.

Price, complete, 25/-

417.—**Projection Microscope and Micro-polariscope** (J. H. Steward).

This is constructed upon the lines suggested by Mr. Lewis Wright but is fitted with improved apparatus and eye pieces as advocated by Sir David Solomons, which ensure high magnifying power, fine definition and a clear outline to the disc.

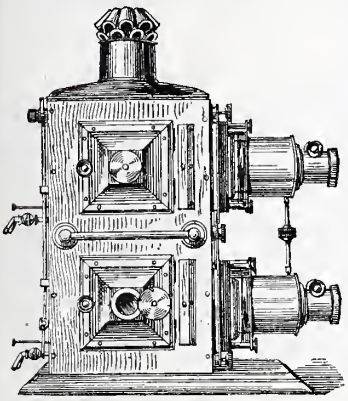
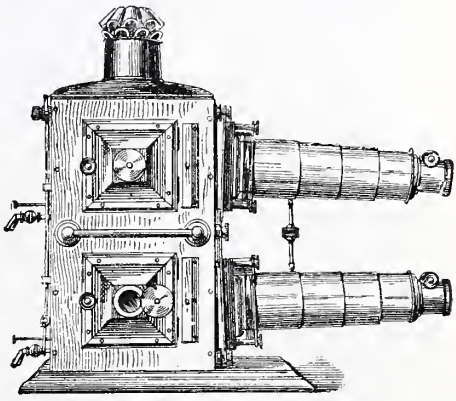


Fig. 1.

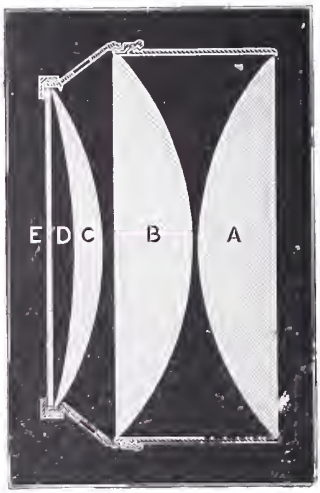


No. 418. Fig. 2.

418.—**Patent Disc Adjustment** (Platt & Witte).

A simple and convenient arrangement of a screw in between the two front tubes for fine adjustment of the discs together or otherwise. Fig. 1 shows the tubes closed, and fig. 2 the same when extended. By merely

turning a milled knob, the tubes can either be brought closer together or further apart. Thus the discs on the screen are easily and comfortably made coincident.



No. 419.

419.—**Chadwick's Condenser** (W. I. Chadwick).

A new form of condenser—a triple, in fact. The smaller lens next the illuminant is easily removed from its cell, and is arranged to be interchangeable for various focii. It is protected from the possibility of breakage by heat by a thin cover glass in front, with an air space between it and the lens.

Price, 4½in., 15/-

420.—**New "Paragon" Lantern Lenses** (Swift & Son).

This firm are working out a new series of projection lenses, ready for next lantern season. The two sent for trial are of 5in. and 6in. focus respectively, and they certainly give a very brilliant and crisply defined image on the sheet. I tried them both with a 4ft. disc and one of 12ft. with every satisfaction. They are computed on the same lines as the firm's well-known "Universal Paragons." The crown used in the front combination is specially manufactured by the Abbé Schott people. The firm write that "it has been suggested that the longest focus one (6in.) should be separated about $\frac{3}{10}$th more than the one sent you. We are told it adds somewhat to the flatness of field, so that in future lenses the body tubes will be made a little longer, the back combination will be altered so as to get it about ¼in. larger in diameter, as this will allow for the objective picking up still more light." At present the intentions of the firm are to issue a complete series from 5in. to 12in. focus.

421.—**New Lantern Lenses** (W. Wray).

A new series of 6 and 9in. focus respectively, of high quality, giving good definition and flat field. They are also correct for photography. The 6in. has an aperture of nearly f/3, and the 9in. full f/4, and with even these large apertures the image is practically sharp to the edges.

Prices—With rack and pinion, 6in., £4 10s.; 9in., £5 10s.; or the two lenses fitting one rack jacket, £9 10s.

EXHIBITION APPARATUS.

The following were noticed in the "Optical Lantern Indispensable Handbook":—

READING LAMPS.
Archer's
„ Candle
Armstrong's
C.P.S. Perfection
Lamp and Desk
Lamp and Stand
Mineral Oil
Ordinary

SCREENS.
Linen
Opaque
Self-acting Roller

SCREEN FRAMES.
Articulosus
Elevators
Ordinary
Small
Universal
Watson's

The following were described in "Photography Annual," 1891:—

Bamboo Screen Frame ... ...Steward
Box for Slides ... ...Stanley
Carrier, Dissolving ... ...Archer
„ Double ... ... „
„ Eclipse ... ...Chadwick
Folding Reading Lamp ... ...Tyler
Lanternscope ... ...Tylar
Opera Glass ... ...Steward
Optimus Reading Lamp ... ...P. S. & R.
Washable Screens ... ...Dyson



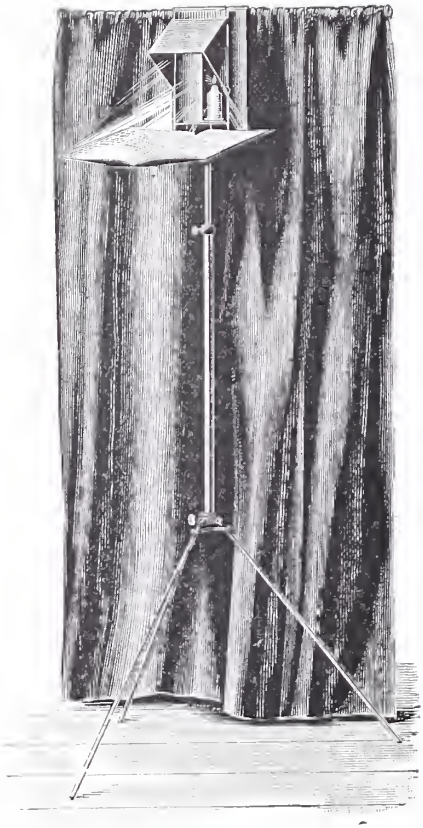
No. 422.

422.—**Travelling Candle Shade for Lantern Lecturers** (W TYLAR).

One of the things that have been long needed is a reading lamp that throws the whole of the light down on the book used while effectively screening it from the audience. This is here accomplished. A plated reflector is supported on a loaded socket by wires; this socket fits on an ordinary wax candle, and as the candle burns down so the socket holding the reflector, travels with it. A curtain runs on small rings round the back edge of the reflector and effectually stops all light getting out at the front of the apparatus.

423.—**Lecturer's Lamp** (W. I. CHADWICK).

Those who, in the course of the season, do any amount of lantern lecturing know how troublesome it generally is, not only to get a properly screened lamp that will burn, but also to get a table or desk the correct



No. 423.

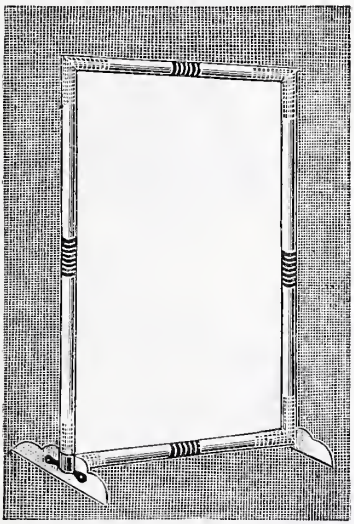
height. It has usually meant in my lectures, "a table, a box, two books, and a piece of wood," which is not very pretty to look at, and if covered over with a cloth is apt to get disarranged underneath. To say nothing of the trouble sometimes involved by the hunt of a table, when one is found it is often too large, and either gets in front of the screen, or the audience think there is "too much table, too little lecturer." Then, also, if it be small, it will probably be rickety, in which case one has to keep one eye on the screen, the other on the sheet, leaving the notes or lecture to take care of itself.

All these irritating little things are overcome by an arrangement such as shown in the illustration. It consists of a folding metal stand, upon which is fixed the lamp. A brass rod runs across the top of the lamp itself, to which is attached a neat black curtain and this serves to screen not only the light, but the apparatus itself, from the audience. In front of the lamp is a neat metal tray or desk for the notes. Portability is thoroughly studied, because the desk when detached folds into three, the lamp removes from the support, the rod and curtain are taken off. and lastly one half the support slides within the other, and the legs again slide up the outside of the main tube. At its highest point—and of course readers will see by the illustration that it can be fixed at varying heights to suit the lecturer—the desk

is 4ft. 7in. from the ground, which requires a very much taller man than I am. At the lowest point it is 3ft., and that is sufficient range for any purpose. Closed, the tube is 33 inches long.

Altogether it is a most useful accessory to the lecturer, and adding considerably to his comfort

Price £1 1s.



No. 424.

424.—New Screen and Stand (Riley Bros.)

A screen stand which is easily put together or taken down, and when closed it goes into a canvas bag and can be carried under the arm. It is very light and yet rigid when erected.

Prices for sheet and frame—9 feet, £1 5s.; 12 feet, £2 10s.; 15 feet, £3 10s.

425.—The Wall Map Pattern Screen (A. H. Baird).

A feature of this screen is that the one side is white and the other black. For lantern purposes pure and simple, the white side is used, while for special experiments on light, &c., the black side is found to be of great advantage. They are made of dense black cloth and strong white cartridge paper, thus admitting of the best possible results being obtained, owing to the opaqueness gained. They are properly mounted on roller with lath.

Prices—6ft.	7ft.	8ft.
16/6	18/6	22/6.

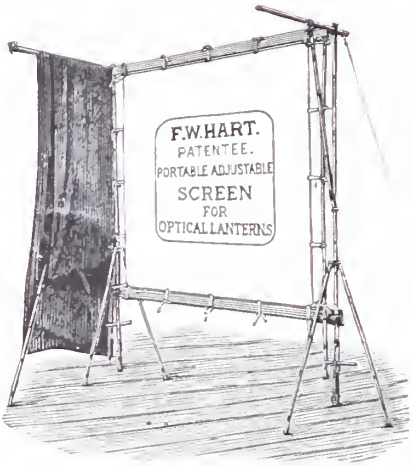
426.—Portable Tripod (Riley & Sons).

This is made very strongly in polished mahogany, and the convenience of raising and lowering the legs, and the canting table top, makes it an attractive stand. A piece of string or one of the patent tripod securers would prevent any accident through a kick or push.

Prices 21/- and 24/-



No. 426



No. 427.

427.—Screen Stand (F. W. Hart).

A very complete and handsome stand for lantern screen, made of jointed bamboo canes, &c.

Prices on application.

428.—Improved Optical Pointer (J. H. Steward).

Sir David Solomons employed recently at the Royal Institution a modified form of optical pointer, which, instead of showing a circular disc of light with a black pointer, was so arranged that it showed a white arrow, the point of which could be projected to any part of the screen, the fittings of stand having a universal motion. The limelight was fitted with independent cut off. This apparatus was constructed by arrangement under Gravell's patent (shown in last year's Annual).

GAS AND ILLUMINATING APPARATUS.

The following appeared in the "Optical Lantern Indispensable Handbook":—

DISSOLVERS.

Chadwick Steward System
Lever
Malden's
Noakes's
One Plug, The
Optimus, The
" The New
Star, Archer's
" Four Way
" Improved (Archer's)
" Six Way
" Three Way
Wood's Bye Pass.

ETHER OXYGEN LIGHT.

Saturator, New
" Steward's
Vapouriser

GAS BAGS.

Dale's
Excelsior, The
Lock Taps
Optimus, The
Pumphrey's
Repairing Solution

GAS CYLINDERS.

Brin's Process
" Cylinders
Calculation Table
Howard, Lane & Co's

GAS GENERATORS.

Chadwick's Portable and Holder
Hydrogen Portable

GAS PURIFIERS.

Hughes's Zinc
Optimus, The

GAS PURIFIERS—*Continued.*

Place's Glass
Purifier Tubes

GAS RETORTS.

Cast Iron Safety
Hughes's Iron Safety
Optimus The
Place's Safety
Saucepan Shape

GAS VALVES.

Back Pressure
Beard & Oakley's
Chadwick's
Clarkson's
Flame Extinguishers
Water Interceptor

JET ACCESSORIES.

Archer's Mechanical Stage
Mason's Holders
Ottway's Supports
Prin le's Cut-off Arrangement
Pumphrey's Mechanical Stage
Check Action Lime Turner
Cylinder Lime Holders
Limes
Lime Turner Movements
Place's Lime Turner
Shield
Star Lime Turner

JETS, BLOW-THROUGH OR SAFETY.

Archer's
Hughes's Best
Noakes's
Optimus, The
Wood's

JETS, COMBINATION OR INTERCHANGEABLE.

Archer's
Interchangeable, The
Pumphrey's
Steward's

JETS, MIXED GASES OR OXY-HYDRO.

Dale's
Hughes's Best
Newton's Best
Noakes's
Optimus, The
Place's
Sciopticon, The
Wood's

JETS, SPIRIT OR OXY-CALCIUM.

Newton's
Ordinary, The
Wood's Automatic

OIL LAMPS.

Euphaneron, The
Five-wick Parisian
Pamphengos, The
Photinus, The
Refulgent, The
Sciopticon, The
Three and Four-wick Lamps
Three-wick, Archer's
Triplexicon, The

PRESSURE BOARDS.

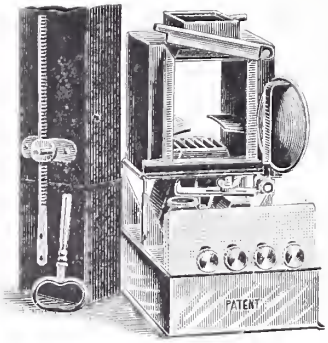
Dale's
Double Skeleton (Archer)
" " (Banks)
" " (Hughes)
Ordinary, The
Reversed End, The
Skeleton, The

The following were described in "Photography Annual," 1891:—

Back Supply Pipes	...Hughes	Grip Clip	...Steward
Beard's Regulator	...Steward	Intermediate Regulator... ...	...Noakes
Cylinder Case	... "	Placing Jets in Position... ...	...
Diminishing Valve	...Appleton	Premier Jet	...Steward
Docwra Jet	...Hughes	Pressure Gauge	...Tyler
Duplex Regulator	...	Reliable Regulator	... "
Fleming's Tester...	...Steward	Warm Air Saturator	...Scott

429.—**Stocks's Oil Lamp** (W. STOCKS).

Perhaps the first thing that strikes the eye is the abnormal length of the chimney, but this is one of the things that tend to its success. In order to really see what difference of light was given by Mr. Stocks's lamp, I did not use two lanterns side by side, as might be deemed by some to be the best way. Condensers and objectives vary, and such a test, to my mind, is far from perfect. There is also another point. The distance of the lamp from the condenser is a factor that must be taken into account, and as all lantern b ses are not the same the results may vary on that score. My



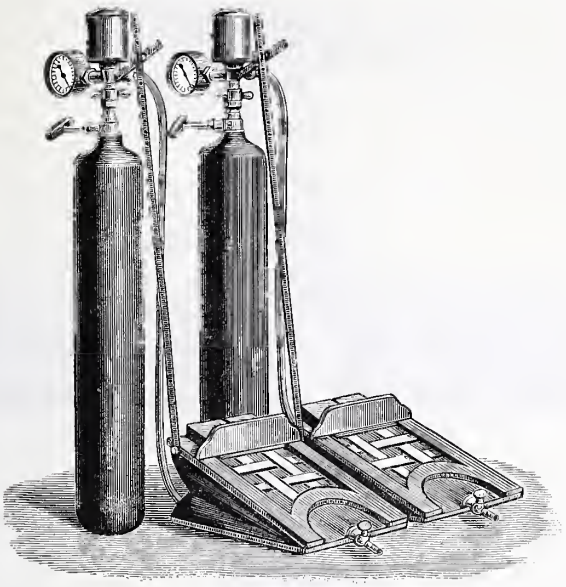
No. 429.

method was with six slides of different densities, the last being very nearly opaque. The one tried against that of Mr. Stocks's lamp was an ordinary best quality three-wick pattern. The difference was considerably in favour of Mr. Stocks's form, as with the same lantern, in fact nothing changed at all except the lamp, detail and special marks were discernible at a standard distance of 12 feet, that were not visible when the other lamp was in use. Both were worked at the very best I knew how; the only question that could possibly arise was whether the wicks were suited to the three-wick lamp? But this is rather far fetched, and, moreover, they were those supplied by the maker. The oil in each was the same. A good deal of the superiority is due to, not only the extra length of the chimney, but also to the ease of regulating it by means of the rackwork. The extra length gives increased draught, which is the most vital thing required by an oil lamp. The rackwork enables the instant regulation of that draught to suit the flame. The reflector, too, is an excellent feature By means of a slot it can be moved nearer to or further from the light itself; it also works upon a pivot, so that the light can be placed exactly in the correct focus with the condenser. And, finally, being outside the lamp, it does not get smoked or discoloured. In the illustration the reflector is shown as moved to one side, which is done so that the interior may be seen. Mica or glass plates can be used in front, and both are supplied—the latter in case of accidental breakage. The four wicks used each measure $1\frac{5}{8}$th inches. The lamp is wonderfully neat in dimension, considering the power of illumination, and it will therefore fit any lantern. Altogether I think Mr. Stocks has a good thing, and one that will be widely appreciated as its merits become further known.

Prices—First quality, 28/- Second quality, 22/-

430.—**Automatic Lever Movement** (W. C. Hughes).

The idea of this, roughly speaking, is the obtaining of more even regulation of the supply gas to the jets. It was originated and perfected by Mr. Collin Docwra. In using compressed gas especially, there is one awkward factor to deal with, viz., that in, say, a triple lantern, reducing the gas at one jet means increasing the pressure at the other two, and, of course, the matter becomes worse if the gas be shut off from two jets at once. This new automatic lever arrangement obviates this evil in the following manner:—It consists of two small gas bags, between boards, one to each gas-bottle. Upon the upper flap is a small weight, which operates upon the gas bag in the same manner as in the case of the larger type of bag in general use, and with equal results. A vertical rod, working on a pivot, extends from each of the upper flaps, and connects with an arm or lever



No. 430.

upon the tap of the regulator, and a rubber tube connects each bag with the outlet of the regulator belonging to it. A cock is provided in the front of each bag, to which is connected the tube leading to the burners. The manner of operation is as follows :—The bags being empty and in a state of collapse, the regulator taps would be open, so that immediately the cocks in the necks of the bottles are opened the gas passes through the regulator to the bags, and as these expand the upper flaps are raised, and consequently their rods raise the levers upon the top of the regulator, and so turn off the supply gradually, and gradually renew it the moment the smallest quantity of gas is consumed from the bags, causing the depression of the upper flaps by the action of the weights. The connection between the rods and the tap-levers being adjusted by means of a pin passing through one of a series of holes in each, the rod, or the arm, or both, can be lengthened or shortened at will in order that the regulator taps may operate at any desired degree of expansion of the bags. The action of these small bags, with their accompanying weights, is automatic and accurate.

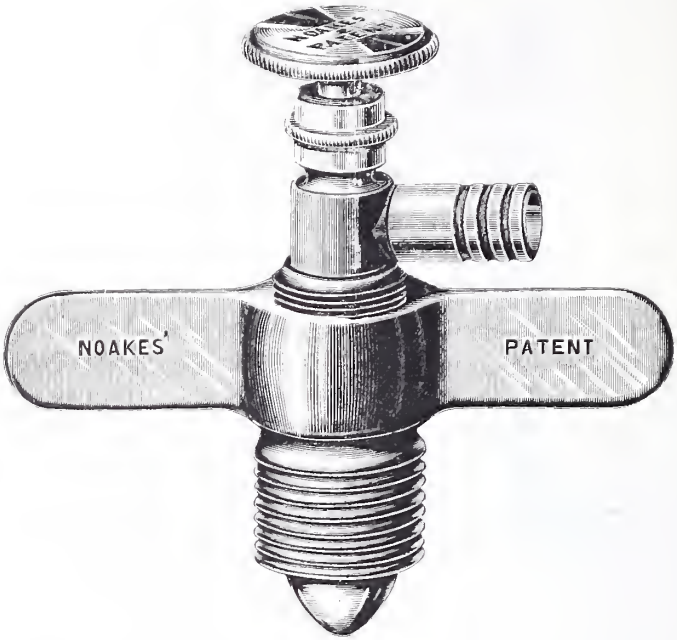
Prices—

1 set with levers, small gas-bag and boards for blow-through jet	£4 10 0
2 sets with levers, for chamber jets	9 0 0

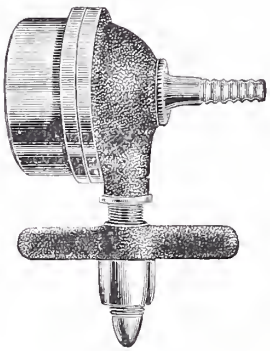
431.—**Non-automatic Regulator** (Noakes & Son).

A very useful contrivance for cylinders when using a single lantern, and saving the cost of the more expensive regulators. There is practically nothing to get out of order, the construction being entirely of metal. By means of screwing down the top the gas can be regulated to a nicety.

Price 10/6



No. 431.

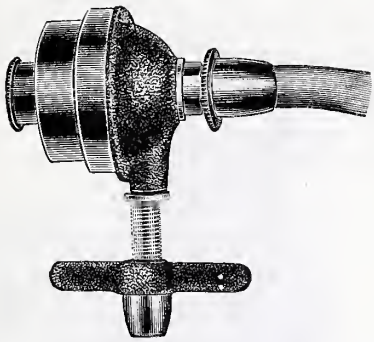


No. 432

432.—**Brier's Low Pressure Regulator,** (Scotch & Irish Oxygen Co

A very neat and compact regulator, adjusted to reduce the pressure of compressed gases to a workable one.

Price £2 9s. 6d.

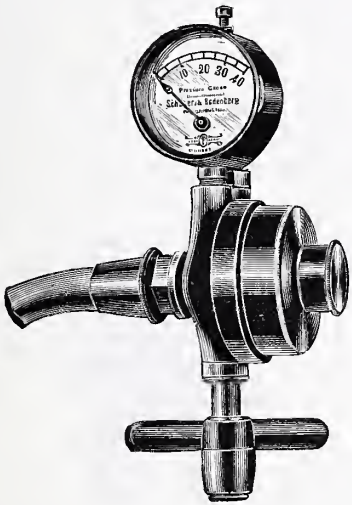


No. 433.

433.—**Brier's High Pressure Regulator** (Scotch & Irish Oxygen Co.

This regulator can be supplied to deliver at any pressure from 5 to 150 lbs. per sq. in., and is fitted with a regulating spring which permits of the pressure being varied to the extent of about 20 lbs.

Price £2 19s. 6d.



No. 434.

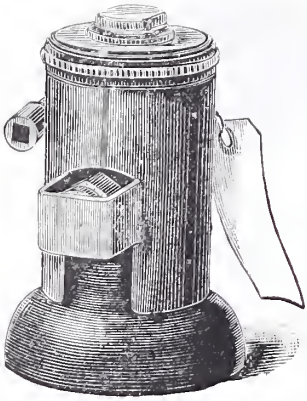
434.—**Brier's Regulator with Gauge** (Scotch & Irish Oxygen Co.)

This regulator is the same as No. 433. with the addition of a first quality Bourdon tube pressure gauge, and a spring safety valve.

Price £4 15s.

435.—**Suiter's "Lock up" Guard** (Trade

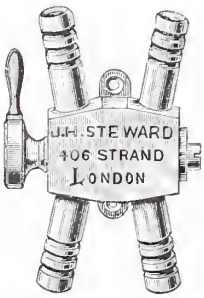
This is to allow the regulator and valve key being always attached to the gas vessel, so as to form a complete apparatus that will be found together when required for use, without fear of their being injured by the roughest usage during transit, and to prevent valve of gas vessel being tampered with.



No. 435.

In other words, to take the place of a lock up box or packing case; it being made of metal it is much more durable and less cumbersome. The instructions for use are as follows:—To lock up valve—the guard is placed over the valve, then the regulator is screwed into its place down on to the guard, and the valve key is passed through the holes to receive it in guard. The string of address label being slipped through the hole in end of valve key, and sealed, it is impossible to get at the valve, or remove regulator without it being known. To unlock valve—cut string off address label, take out valve key, unscrew regulator, take off guard, then screw regulator into its place again without the guard.

Price 10/6.



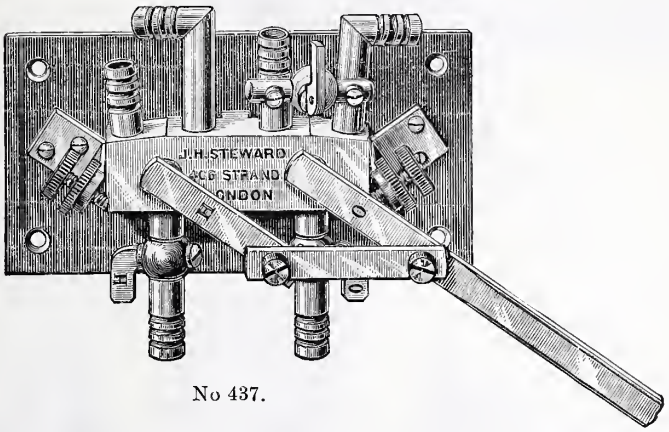
No. 436.

436.—**A New "Cut-off," or Single Dissolver** (J. H. Steward).

This should be useful on numberless occasions when single optical lanterns, or biunial, after once being adjusted, have to be left for any purpose. The two outer tubes convey the oxygen and hydrogen, respectively, through the plug and out on the other side when the lever is down, as shown in illustration, but, when it is up, the gas is cut off, excepting a small bead of hydrogen, which a groove in the plug permits to pass. As it can be used with any jet, it should be an accessory to every lanternist's apparatus, and for photographing microscopic objects with the limelight as

the luminant, should be most useful. Two of these on a biunial, or three on a triple, would answer for dissolving if everything was required to be as small as possible. I have found it exceedingly useful when compelled by circumstances to trust the lantern to a friend possessing but little knowledge of manipulating a jet. All that is necessary is to get the light burning correctly, then cut it off until it is required, and anybody can then turn it on.

Price 12/6.



No 437.

437.—**Improved "Double-Plug" Dissolver** (J. H. Steward).

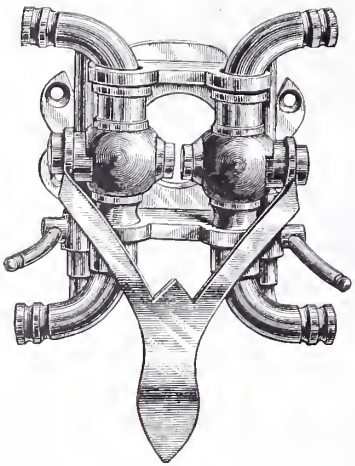
It is arranged with fine adjusting screws for regulating the exact amount of bye-pass, and after adjusting to degree required, to lock same with locking nut; also bye-pass stopcock for oxygen when required. This is a development of the early type of dissolver in use 25 years ago, and has been resuscitated on account of the anxiety felt by some lanternists in using a single plug where, under certain conditions (of loose plug, &c., or indifferent fittings), the oxygen and hydrogen gases could mix in the plug. Here everything is quite independent, and under no conditions can they mix. It is well finished in bright brass.

Price £1 18s. 6d.

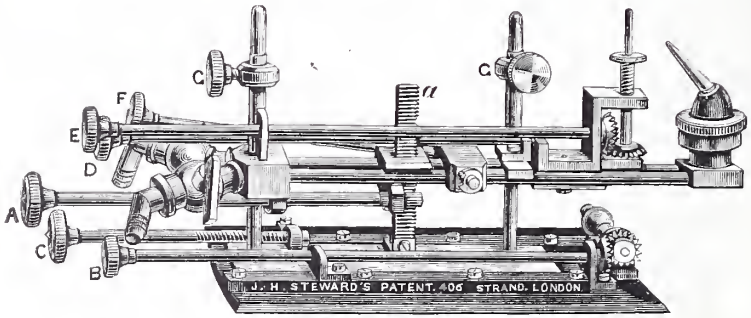
438.—**The "Simplex" Single Dissolver** (W. C. Hughes).

A dissolver that is equally applicable to biunials or triples. A dissolver for each lantern always possesses one advantage, that of simplicity, and consequent reduction of liability to mistakes in attaching the tubing incorrectly. Moreover, when each jet has a separate dissolver there is no fear of any hitch, because it is simplified by merely turning the one off and the other on. In the "Simplex" the gases cannot possibly mix, because each gas passes separately through each stopcock. Where, with a single plunger, there is risk should any portion of it become loose or defective, it is not so with the above; the two gases are kept apart before they enter the chamber of jet. These have bye-passes—one for oxygen and one for hydrogen, and after the gases have been regulated at the jet taps, the light is turned on or off by raising or depressing the lever handle which is attached to the dissolver.

Price 18/6.



No. 438.



No. 439.

439.—**The "Premier" Jet** (J. H. Steward).

This jet has now a new conical nozzle and improved mixing box. It is specially constructed for use with compressed gas, and for which is claime the advantage of giving 20 per cent. more light than those previously introduced. The movement make the centring and adjusting of light a certainty, and every movement can be made without any confusion, the operator having everything under control from outside the lantern. To say it is simple is a fact, notwithstanding there are (*a*) movements to regulate the height; (*b*) to turn the jet laterally; (*c*) to move the whole jet nearer too or further away from condenser; (*e*) to turn the line; (*f*) to work the "cut-off" tap; (*g*) the double pillar that make the rising arrangement quite steady, and clamps should it be desired to clamp it.

Price £6 10s.

440.—**Suiter's "Reliable" Regulator** (Trade).

These being constructed entirely of brass, there is no rubber to get too hard or too soft, or to perish by the action of the gas. Though quite a



No. 440.

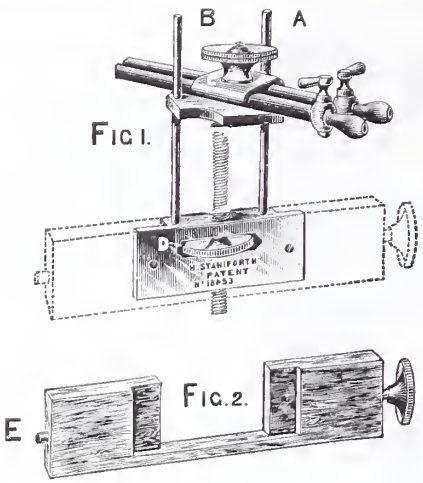
recent introduction, this regulator has met with much approval to my certain knowledge. As the illustration represents it the actual size, it will be seen how small and handy it is. The cost, too, is lower than usual with regulators.

Price £1.

441.—New Jet Holder (H. Stainforth).

Quite a new thing, and a most convenient addition to any lantern. A glance at it was sufficient, and it was forthwith attached to my own, with most satisfactory results. It is an attachment for raising, centring or lowering jets, which can be fitted to any existing lantern, and any plain jets. Moreover, the usual tray is dispensed with entirely. It is very rigid, and practically gives all the powers of the most elaborate and expensive rack-work jets. The directions for use will explain it clearly. "Take off the nut A and place jet under the clamp C, then screw down the nut just sufficient to allow the jet to be moved backwards or forwards, right or left. To move the jet up or down turn the wheel D. When the light is properly focussed screw down the nut A. To adapt the jet holder to single lanterns see fig. 2, which is a piece of wood 1¼in. wide. At one end is a peg E, at the other a set-screw F. To fix it into the lantern make a hole on one side for the peg, and one on the other side for the set-screw."

Price 10/-



No. 441.

442.—**Testing Oxygen Cylinders** (Scotch & Irish Oxygen Co.)

I quote the following from an article in the *Magic Lantern Journal*, by Henry Brier:—"It has generally been considered sufficient to test cylinders by simply pressing them with water to the desired pressure, but this system is very faulty, inasmuch as, although it shows a cylinder's capability of withstanding the required pressure on that occasion, it does not indicate if it has become damaged thereby. To overcome this difficulty, several trials were made in 1890 with an apparatus which was designed to indicate the stretch of cylinders, with which very marked results were obtained, and this plan of testing has now been adopted by the Scotch and Irish Oxygen Company, of Glasgow. The illustration shows the testing apparatus, which explains itself. Each cylinder on reaching the works, receives a number, by which it is known; it is filled with water in the usual manner and is placed vertically in an iron envelope, as shown, and is supported by three chains. The envelope also is filled with water to the exclusion of air. A perfect joint is made round the shoulder of the cylinder by means of a flexible rubber ring, which can be at will instantaneously inflated by means of water drawn from any convenient source; in this manner all communication between the envelope and the atmosphere is closed, with the exception of an outlet through a small-bore glass tube, which serves as an indicator of displacement of stretch. The cylinder is then coupled up to the hydraulic pump, and the test is made as follows: The height of the water in the gauge glass is first marked. The pressure is then put slowly into the cylinder by means of the pump, and stretch in every case is shown from the moment the first indication of pressure is seen on the pressure-gauge; the water in the gauge-glass rises with every stroke of the pump, until the maximum pressure is reached, on release of which it falls, with good cylinders. to its original position, showing that the elastic limit of the metal has not been passed, and the cylinder in no way damaged. The cylinder is then stamped with the test-mark if proved sound, the pressure of the test, and the date, and the test is recorded in a book, with the name of the maker and the signature of the person who saw the test carried out. All cylinders destined for a working pressure of 1,800 pounds are in this manner tested to 4,000 pounds per square inch; and, for fear of overstraining them, special care is taken that the makers do not previously test

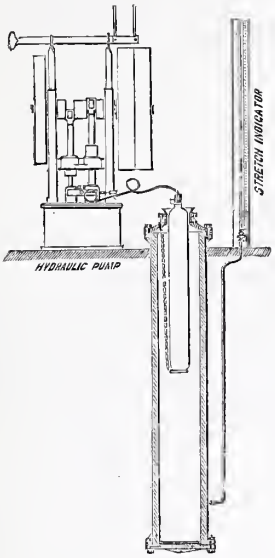


Negative by Robert Frost, Loughborough.

MY NEW PINAFORE.

(Silver Medal "Photography" Enlargement Competition, 1892.)

Specimen of Half-tone Engraving by John Swain & Son, 58, Farringdon Street, London.



No. 442.

them to more than this pressure, which is considered to be a safe and sufficient test for the cylinders of the section and quality of steel now employed. A forty-foot oxygen cylinder, when tested to 4,000 pounds, has sufficient elasticity to displace, on an average, a column of water 22 inches high by $\frac{1}{4}$ inch diameter, and to return again to its original state; this cylinder would measure $5\frac{1}{2}$ inches diameter by 31 inches long by $\frac{7}{32}$ inch thick. It will, therefore, be readily seen that this system of testing gives an insight into the behaviour of the cylinder whilst under pressure, with sufficiently broad results to be easily applied and appreciated in the ordinary workshop by any intelligent man."

443.—**Label for Gas Cylinders** (J. H. Steward).

This is a leather card-holder, with strap to fasten round the neck of the cylinder, and a card upon which is arranged for recording the number of the cylinder, the date filled, contents in cubic feet, three spaces for dates of using and length of duration each time, and the weight of the cylinder full and empty. On the other side is space for direction by rail or otherwise. This card, therefore, serves the double purpose of a record of the cylinder and a direction label to send it away.

Price 1/-



No. 444.

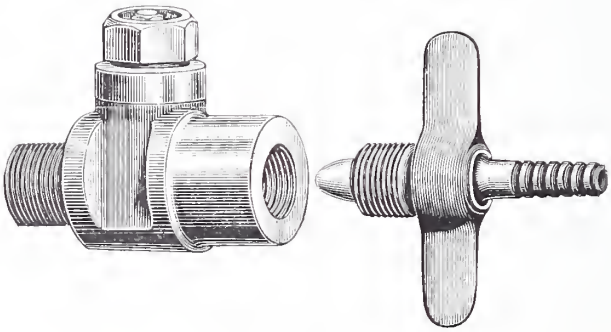
444.—**Gas Cylinders and Compressed Gas** (Scotch & Irish Oxygen Co.)

Distinctions are necessary with cylinders we know, and this company paint theirs as follows :—

Oxygen	Green
Nitrogen	White
Hydrogen	Red
Coal Gas	Red
Carbonic Acid	Grey
Nitrous Oxide	Yellow

The following are the details of prices, &c., for oxygen and hydrogen cylinders. Coal gas is ½d. per foot less.

	Cubic Contents in feet.	Diameter in inches.	Length.	Gross Weight.	Value of Cylinder.	Rent per week after 14 days.	Price of gas per foot.	Price of gas per cylinder.
			ft. in.	lbs.	£ s. d.	s. d.	d.	£ s. d.
Solid Drawn.	5	3½	0 11	6	1 10 0	1 0	4	0 1 8
	12	4	1 7	18	1 14 6	1 0	3⅜	0 3 4½
	20	4	2 6	26	1 15 6	1 0	3	0 5 0
	40	5½	2 9	30	2 7 0	1 3	2¾	0 9 2
	80	5½	5 0	50	2 16 9	2 0	2⅜	0 15 10
	100	5½	6 6	70	3 2 3	2 0	2¼	0 18 9
	125	5½	8 0	90	3 7 6	2 0	2⅛	1 2 1½



No. 445.

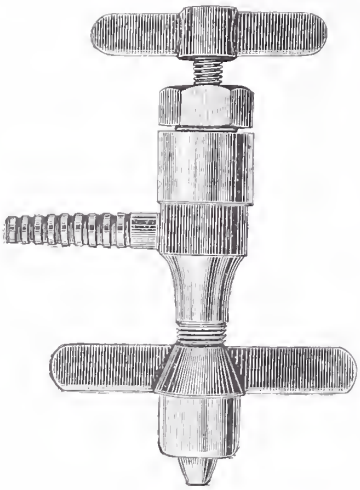
445.—**Brier's Gland Valve** (Scotch & Irish Oxygen Co.)

A special valve for cylinders which can either be fitted to those issued by the company, or to those of customers. The feature of it is that it is readily removable, and as the parts are made strictly interchangeable, any damage is easily put right. The illustration shows the valve with the nipple and union ready to screw in.

Prices—9/- ; in customer's cylinder, 10/- ; nipple and union, 2/6.

443.—**Ascertaining Quantity of Gas.**—By the kindness of the Scotch and Irish Oxygen Company, I am able to give a convenient glance table. The quantity of gas contained in a high-pressure cylinder varies with the pressure. The pressure of the gas being known as well as the size of the cylinder, the quantity of gas still contained will be easily ascertained from the following table:—

Size of Cylinder in Cube feet.	Diameter in Inches.	Length.	Gross Weight.	Pressure in lbs.																	
				1,800	1,700	1,600	1,500	1,400	1,300	1,200	1,100	1,000	900	800	700	600	500	400	300	200	100	50
		ft. in.	lbs.																			
3	3	0 7	4½	3	2¾	2½	2½	2¼	2	2	1¾	1½	1½	1¼	1	1	¾	½	½	¼	—	—
5	3½	0 11	6	5	4½	4¼	4	3¾	3½	3¼	3	2¾	2½	2	1¾	1½	1¼	1	¾	½	¼	—
10	4	1 4	15	10	9¼	8¾	8¼	7¾	7¼	6¾	6	5½	5	4¼	3¾	3½	2¾	2	1½	1	½	¼
12	4	1 7	18	12	11¼	10½	10	9¼	8½	8	7¼	6½	6	5¼	4½	4	3¼	2½	2	1¼	½	¼
20	4	2 6	26	20	18¾	17¾	16½	15½	14¼	13½	12	11	10	8¾	7¾	6½	5½	4¼	3¼	2	1	½
40	5½	2 9	30	40	37¾	35½	33¼	31	28¾	26½	24¼	22	20	17¾	15½	13¼	11	8¾	6½	4¼	2	1
80	5½	5 0	50	80	75½	71	66½	62	57¾	53	48¾	44¼	40	35½	31	26½	22	17¾	13¼	8¾	4¼	2
100	5½	6 6	70	100	94¼	88¾	83¼	77¾	72	66½	61	55½	50	44¼	38¾	33¼	27¾	22	16½	11	5½	2½
125	5½	8 0	90	125	118	111	104	97	90¼	83¼	76¼	69¼	62½	55½	48½	41½	34½	27½	20¾	13¾	6¾	3¼
225	5½	14 0	177	225	212½	200	187½	175	162½	150	137½	125	112½	100	87½	75	62½	50	37½	25	12½	6¼

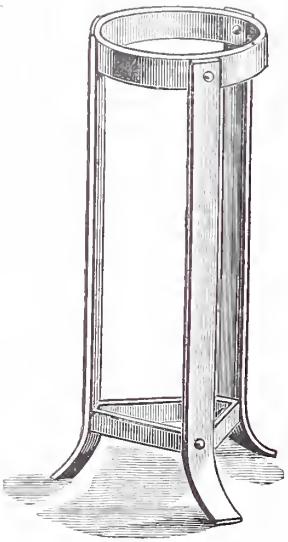


No. 447.

447.—**Fine Adjustment Valve** (Scotch and Irish Oxygen Co.)

The above represents a fine adjustment valve for regulating to a nicety the flow of the gases from high pressure cylinders. It is made with a stuffing box and screwed gland, so that should a leak at any time appear at the spindle, it can at once be prevented by screwing down the gland or hexagon nut; this arrangement also enables a damaged spindle to be removed without necessitating the renewal of the whole valve.

Price 10/6.

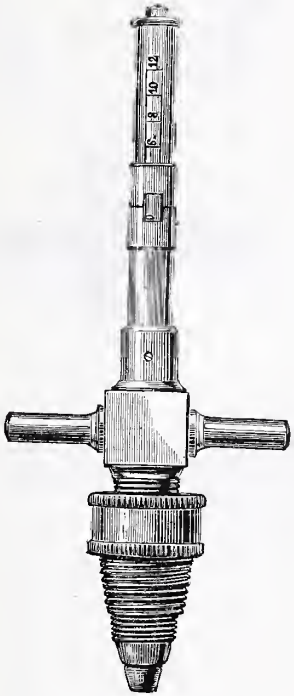


No. 448.

448.—**Stands for Cylinders** (Scotch & Irish Oxygen Co.)

These are neatly made of wrought iron and painted. They are intended as stands for the cylinders, and considering the low price are extremely useful accessories.

Prices—Up to 20 feet cylinders, 5/- ; up to 100 feet cylinders, 7/-



No. 449.

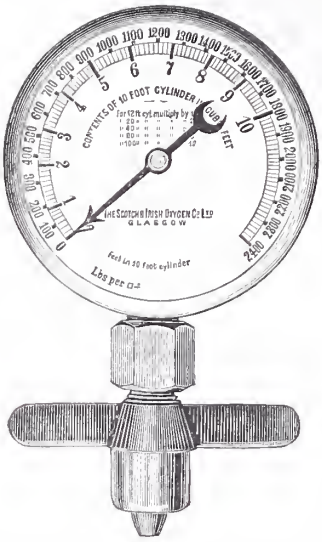
449.—**Suiter's "Pocket" Pressure Gauge** (Trade).

The illustration is just half the size of the real article, and this will serve to give an idea of its neatness. It possesses the advantage also of having no glass face to break either in transit, or to be blown out by sudden pressure. It is, moreover, extremely simple in construction, and the price is lower than most gauges. It is made entirely in brass.

Price £1.

450.—**New Pressure Gauge** (Scotch & Irish Oxygen Co.)

This is constructed with Jackson's patent safety check, a loose back, and a special register dial. The improvements in this gauge render it quite impossible for it to explode with oxygen, even though it be filled with oil or



No. 450.

inflammable gas before allowing the oxygen to enter. The dial carries two sets of figures, the outer ones being lbs. per square inch as usual, the inner figures represent the feet in a 10 foot cylinder. A small table in the centre of the dial explains how the contents of other cylinders are to be calculated by multiplication.

Price £1 15s.

PART III.

LANTERN SLIDES AND SLIDE APPARATUS.

MAKING SLIDES. CARRIERS, &c. SETS OF SLIDES.

MAKING SLIDES.

The following appeared in the "Optical Lantern Indispensable Handbook":—

SLIDE MAKERS AND SLIDE PAINTERS.

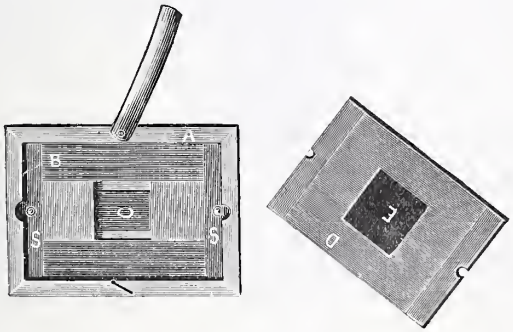
Appleton & Co.
Cubley & Preston
Hughes, W. C.
Mason & Co.
Newton & Co.
Noakes & Son
Pexton, C.
Pumphrey, A.
Riley Bros.
Sciopticon Co.
Scott, A. W.
Solgraph Co.
Theobald & Co.
Underhill, A.
Valentine & Sons
West & Sons
Wilkinson & Co
Wilson & Co.
York & Sons

COLOURS.

The "Rainbow"
Theobald

The following were described in "Photography Annual," 1891:—

Accessories, complete	...	...	...Adams
,, ,,	...	...	...Fry
Binders, Metal	...	...	...Hughes
,, Paper	...	...	... ,,
,, Comb Metal	...	...	...Moore
Binding	...	...	...Adams
,, Coloured	...	...	...Wormald
Colours for Tinting	...	...	...Whittaker
Cramp	...	...	...Hunter
Masks	...	...	...Adams
,, Artistic	...	...	...Tylar
,, Gradation	...	...	...Wormald
,, Symmetrical	...	...	... ,,
Printing Frame	...	...	...Adams
,, ,, Covers	...	...	...Marion
Vice	...	...	...Tylar
White Ink	...	...	... ,,
,, Spots	...	...	...Adams



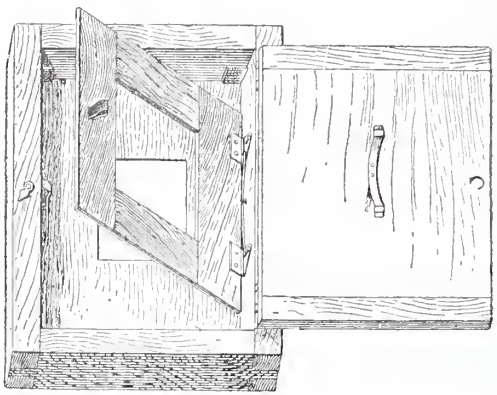
No. 451.

451.—**Lantern Slide Printing Frame** (WORMALD & Co.)

This convenient frame consists of (*a*) a frame or tray large enough inside (cloth lined) to permit the negative to be placed in any position over a

central 3¼in. opening. On the outside are two springs for use when required to carry a 3¼ glass with mask mounted upon it. (*b*) A template to receive lantern-plate in a central 3¼ opening, falling exactly over portion of negative selected—this template is cloth covered, and screws down so as to secure the negative firmly in position. (*c*) A lid or back with central cloth covered projection fitting into 3¼ opening in the template, into which it is pressed firmly by an outside spring, fastening in the usual way. It is well made in ash, the template being mahogany. Two sizes are now made, viz., No. 1 to hold any size negative up to ½ plate, and a new size No. 2 for 5 × 4 and ¼ plate negatives.

Prices—No. 1, 7/6; No. 2, 5/-



No. 452.

452.—**The Dore Frame** (Jas. Dore).

A compact and well-made frame for printing lantern slides from large negatives. The special features are the sliding hinges on the frame holding the lantern plate, by which it is registered automatically to the thickness of the negative, and also the spring which holds the negative firmly in position. The ½ pl. size measures 8½ × 10½, and the whole plate 10½ × 15 inches. It is neat and extremely handy in use.

Prices—¼ pl., 5/6; ½ pl., 7/6; ¼ pl., 10/-

453.—**The "Autocrat" Frame** (G. S. Martin).

This is about the smallest and neatest of the various transparency printing frames. It consists of one piece of wood in which is cut an opening the size of the lantern plate. A wood cover over this is kept tightly down by a spring. The front has a cardboard mask, under which the negative is placed in position, both being held by two strong springs. Any size up to ½ plate can be printed from, and the mask gives a narrow white edge, which is very useful in judging the clearness of the high lights.

Price 2/6.

454.—**Rendell's L. S. Printing Frame** (W. Middlemiss).

Although perhaps just too late for the season, this new frame for contact printing of lantern slides has just appeared, and as it possesses distinctive features it will doubtless be appreciated as soon as our workers start slide-making again. It is strongly made in black wood, and has the

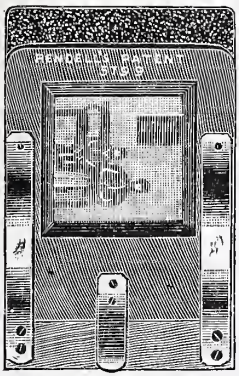


Fig. 1. No. 454.

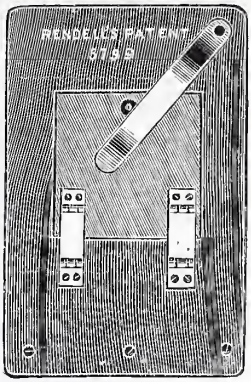
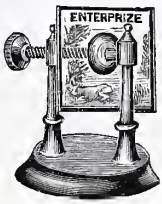


Fig. 2.

usual opening in the back for the plate. The door of this, however, has special hinges which tend to more comfortable working. A spring serves to keep it tight when closed. The front is covered with cloth, and has a framework upon it with an opening of the correct size. This is automatically adjustable to any thickness of negative by means of two strong springs. The one sent for trial measures $8\frac{1}{2} \times 5$ inches only, and yet would print from any part of a whole-plate negative. In fact, any size negative up to 15×12 could be utilised, but, above whole-plate, it would not be possible to print from *any* part of it. Altogether it is an extremely useful and cheap article, which will certainly obtain a good sale.

Price 3/-



No. 455.

455.—**Lantern Slide Clamp** (Photo Enterprise Co.)

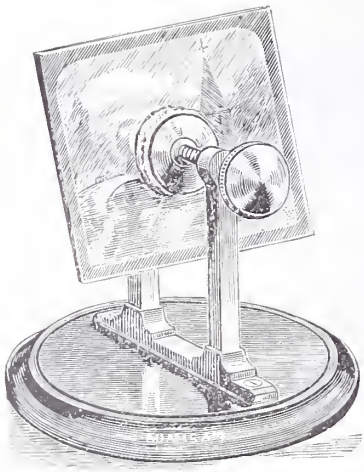
A cheap little clamp for holding the slide during binding, so that when once fixed neither the glasses nor mask can move out of position, the whole revolving to admit of binding.

Price 3/6.

456.—**Revolving Vice** (Adams & Co.)

For holding the slide tightly in position during the operation of binding. Well made in brass upon a mahogany base.

Price 4/-, or nickel-plated, 5/-



No. 456.

457.—**Metal Binder** (Photo Enterprise Co.)

This is new, and consists really of a hinged frame, into which the slide is first placed, and then the whole is kept taut by a small tongue at the top being passed through a slit and bent back. No cement is needed, and the operation of binding is wonderfully speedy.

Price 1/- per dozen.



No. 457.

458.—**Ready Marked Lantern Masks** (Geo. Wheeler & Co.)

These consist of the usual series of masks, upon which are placed the two white spots already for use, so that when the mask has been placed between the two glasses, and the slide bound up, it is complete. Practically it amounts to saving one the trouble of sticking on the spots, or in painting little white dabs on the mask. Many of us, too, place the spots outside the glass, in which case two risks are incurred, viz., liability to fall off through friction or heat, and the chance of placing them on the wrong side through inadvertence. And as the cost of the masks is not increased, it is a little bit of work saved that is worth attention.

Price 1/- per box of 80.

459.—**Lantern Masks** (Wormald & Co.)

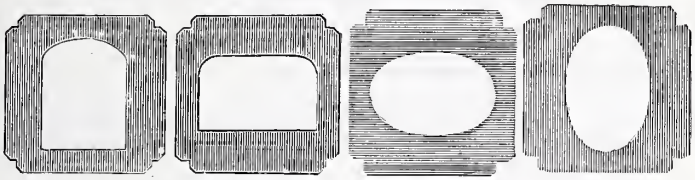
An addition to the now well-known "Gradatim and Symmetrical" series, making those issued by the firm wonderfully varied and complete. They are for reductions from 10 × 8 and 5 × 4 negatives, and give precisely the size opening required for including the whole picture in the largest possible space. They are issued like the others, black, white, black and white, and colours.

Price 1/- per box of 60.

460.—**Microscopic Masks** (Wormald & Co.)

Size 2 × 2½in. circles for microscopic slides.

Prices same as No. 459.



No. 461.

461.—**Metal Binders and Masks** (Jas. Moore).

To the series noticed on page 663 Phot. An., 1891, has now been added the above shapes, so that in this direction users are well catered for.

Price 12/- per gross.



No. 462.

462.—**Combined Mask and Binder** (A. H. Baird).

This is a flat paper mask gummed all over on one side. This side is moistened, the slide and cover glass placed in correct position, the sides

A A turned over, then the four little corner pieces, and lastly B B. These corner pieces add considerably to the strength of the binding, giving practically a double thickness at the extreme corners.

Price 1/- per box assorted shapes.

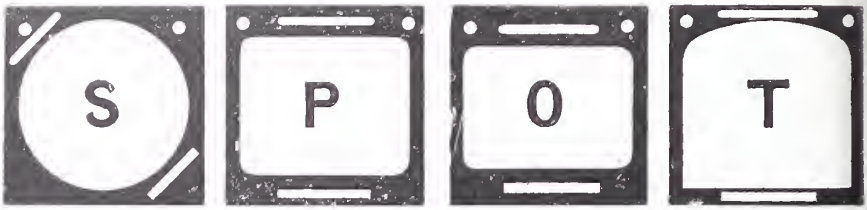


No. 463.

463.—**Coloured Masks** (C. C. Vevers).

277 These are now issued in five or six colours uniform with the binding strips, so that for any purpose of classification of subject, or distinction between different slides or sets for any purpose whatever, the coloured mask is a great help to the binder.

Price 6d. per box assorted.



No. 464.

464.—**Spot Masks** (Fry Manufacturing Co.)

These are a series of perfectly opaque masks of black paper, upon which appear not only two white spots, but two white spaces for describing the subjects. Of course the idea is stupidly simple, but then no one has thought of it before. It is one of the very best things that has yet appeared in this direction.

Price 3d. per doz.

465.—**Ground Glass Slides** (A. H. Baird).

This is a set of materials ready for utilising a method of producing sketches, drawings, etc., on ground glass. After the sketch is made, it is protected with a coating of a varnish or medium, which at the same time renders the glass transparent. Some of those done by Dr. Hall Edwards, and shown before the Midland Camera Club, were exceedingly good.

Prices—Ground glass, 1/- per doz.; medium, 1/-; box of three special pencils and stump, 3/-

466.—**"Lantern Slides and How to Make Them"** (Fry Manufacturing Co.)

This work has met with a phenomenal sale. It is really a very handy little treatise upon the question, and one that should be in the hands of all amateurs and professionals who use dry plates in making their lantern slides.

Price 6d.

CARRIERS, &c.

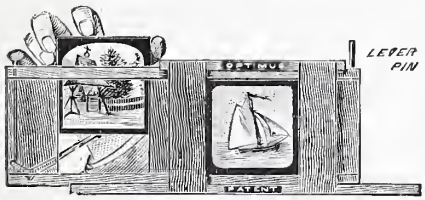
The ollowing appeared in the "Optical Lantern Indispensable Handbook" :—

CARRIERS AND FRAMES.
Archer's Quick Action
Beard's Self-centring
Double Carrier
„ „ (Theobald's)
Eclipse, The
Facile, The
Hughes's Automatic
Panoramic, New
Place's Quick Changing
Presto, The
Skeleton, Panoramic
Slide Frame
Sliding Carrier
Simplex Lever, The
Single Carrier
„ Registering

VARIOUS.
Grooved Boxes
„ „ Numerical
Mounts or Masks
Noakes's Registering System
Registering Apparatus
Steward's Centring Stages
Tinter and Dissolver
„ Openings
Tinting Diaphragms

The following were described in "Photography Annual," 1891:—

Dissolving Carrier ...Archer | Double Carrier ...Chadwick | Eclipse Carrier ...Chadwick

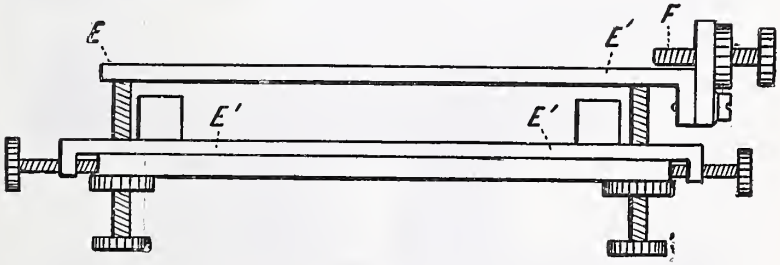


No. 467.

467.—**The Optimus Lift Lever Carrier** (PERKEN, SON & RAYMENT).

Only those who have done much lecturing can appreciate the exceedingly dirty state the slides get into in handling with the ordinary carriers. I always allow for a couple of hours some time before the lecture in which to clean and polish up the slides, *i.e.*, both sides. True, I always endeavour to get a friend to do it for me, but that does not alter the fact. Now with this new carrier the trouble is avoided if it be used correctly. A lever at the bottom is moved by a pin projecting through the top, which raises the slide as shown in the illustration. Indeed, I think no further explanation is necessary, as it so clearly shows the method of use, and the fact that the slide is grasped by the edges proves its efficacy as a preventive of soiling or greasing the glass. It is exceedingly moderate in price.

Price 2/6.



No. 468.

468.—**Registering Slide Runners** (J. H. STEWARD).

These have been designed by Sir David Salomon, and constructed so as to ensure the perfect centring of slides at any time after once the framed

views or effects have been adjusted. for not only can ordinary slides that abut against the turning up stop F, as shown above, be re-centred at any time, but also those that have wooden or metal stops put to the bottom of their wooden frames, and which abut against the end of the slide runner E. The adjusting screws G and G allow of the original normal distance being obtained at any time without having to interfere with the wooden frames of slides, and are useful for all distances from the screen, when the front of lanterns may be varying angles.

Price £2 2*s*.

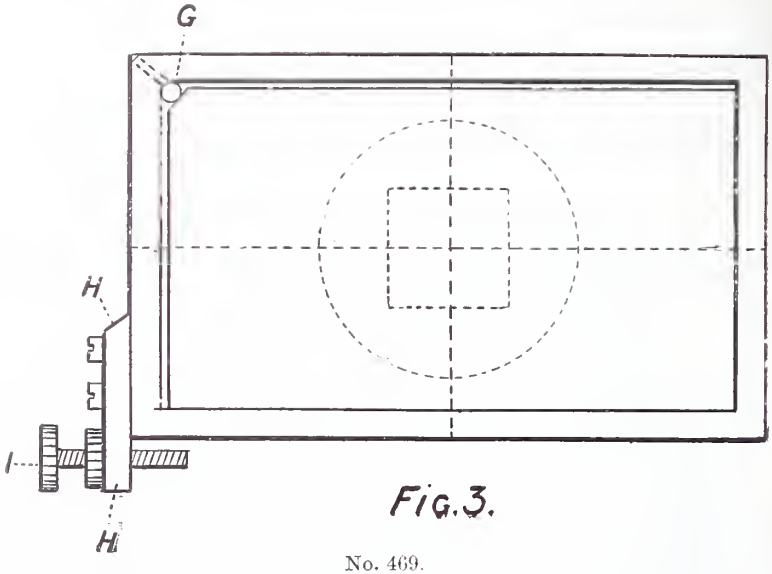


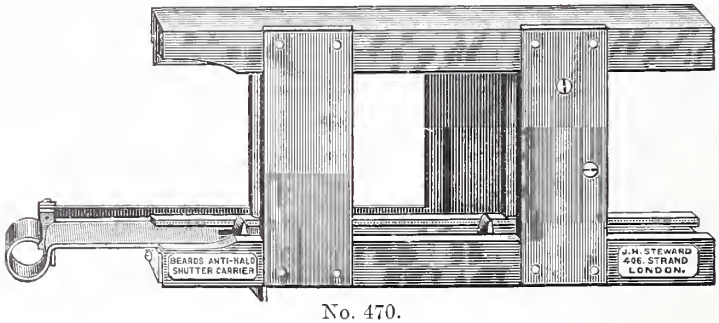
Fig. 3.

No. 469.

469.—**Standard Registering Crosses** (J. H. Steward).

These are mathematically divided plates, with two trued edges to work on the runners and press against stop, mounted in brass frame, with adjusting screw and stop, as shown in fig. 3. Glass plates (thick), mathematically divided in the above design, with two trued edges, and protected with mahogany face and edges of other sides.

Prices—Crosses, £2 15*s*.; plates, 15/- each.



No. 470.

470.—**The "Anti-halo" Self-centring Carrier** (J. H. Steward).

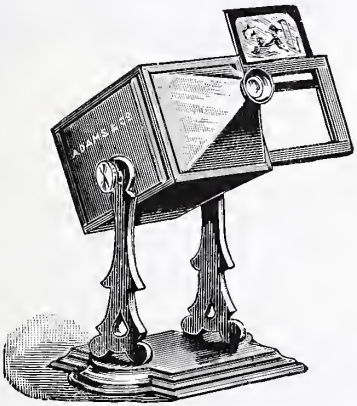
This has a metal blind or screen, so that on withdrawing the slide last used the opening in frame is closed up, and prevents any "afterglow" from the lime projecting a circular or other halo of light, a matter of some importance when slides are being changed very quickly, and the operator has not time to turn the lime immediately after dissolving.

Price 10/6.

471.—**New Carrier** (Trade).

Early this year a most convenient double carrier was placed upon the market. It has no special name, but it is none the less a capital idea. It is of the usual double push through variety, but by means of grooving in the frame, and a loose piece in the slide opening, as soon as it is pushed home the slide that has been shown is raised about an inch above the level of the top. This enables the slide to be removed by the top, and avoids the marking with fingers that occurs in the usual way. It is perfectly automatic in action, and extremely simple.

Price 4/6.

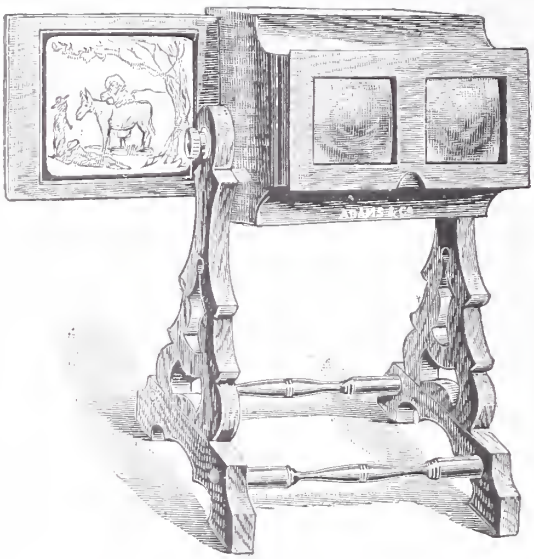


No. 472.

472.—**The Pantoscope** (Adams & Co.)

Holding up a lantern slide to the light, or using a piece of white paper as a reflector, we must all admit is a very unsatisfactory way of judging its merits or weak points. Many utilise a lantern for this purpose, but that is very troublesome. Here we have a neat little contrivance, and one not only for the purpose of seeing whether the slide is of the right density and other technical details, but also a convenient means of showing slides to friends; when to rig up a lantern and sheet with all the labour and trouble of it is out of the question, for lack of time or for lack of the lantern. We may not all have lanterns, but most of us make slides. The "Pantoscope" is not a new idea, but it has one decided improvement, viz., the double carrier, which only necessitates two slides being in use, and gives the power of very rapid changing. Altogether it is a most useful article to a lantern maker, and a capital method of entertaining friends. And as a slight stereoscopic effect is given to the pictnre it is far away superior to any plan of looking at the slides with the naked eye.

Price 15/-



No. 473.

473.—**The Binocular Pantoscope** (Adams & Co.)

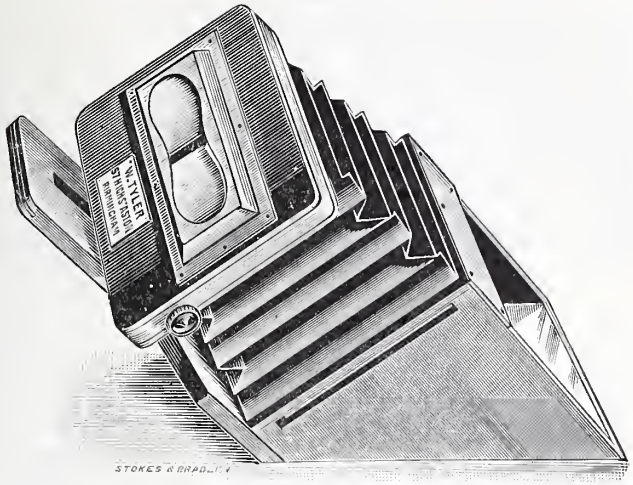
It must be admitted that in looking at lantern slides, using both our eyes to do so, is not only more comfortable, but is what we ought to be able to do. And as we—that is, most of us—have two eyes, it is going out of our way to shut one up. Further, the effect is not the same. In its other details, the above pattern follows the general outlines of the "Pantoscope" (see No. 472), though there are improvements. The magnification is about double, and by means of a mirror attached to the lid at the top, ordinary photographic prints, &c., may be examined in the same way. The excellent double carrier is again fitted, which makes the passing through of slides easy and speedy. In construction and finish the binocular is everything that can be desired.

Price £1 5s.

474.—**Reflecting Hand Lanternscope** (W. Tylar).

The original lanternscopes as first issued by Mr. Tylar are well known, and the new pattern is the outcome of some two years' experience in making instruments for the purpose of viewing lantern slides. This pattern is thoroughly well made, the illumination being obtained by light reflected from a mirror, and further diffused by passing through ground glasses before reaching the slide. With this, too, there is a longer range of focus than possessed by any other pattern. No special illumination is needed, top or bottom light being equally available. It can be held in the hand or stood on a table on a pile of books. The lens supplied is of good magnifying power, and covers the whole of the plate. A more brilliant illumination is secured, and the slides are self-centred, easily placed in position, and as easily removed. The front is nickel-plated, real leather bellows, and solid mahogany polished body.

Price 12/6.



No. 475.

475.—**Binocular Reflecting Lanternscope** (W. Tylar).

Has all the advantages of the latter, and a further advantage, viz., that both eyes can be used for viewing the slides. This, in a long sitting, is a great comfort. This is the only pattern in which the lenses are made adjustable for the varying widths of human eyes. It can be had as shown, or on a stand as preferred.

Prices—17/6 upwards (also a cheaper form with fixed lenses will be issued).

476.—**Lanternscope Tinter** (W. Tylar).

The tinting of slides by means of coloured glass or gelatine enhances their effect, and Mr. Tylar has arranged an appliance for revolving a series of different coloured mediums in such a manner as to give the slides viewed in the lanternscope coloured effects. It is simple, and can be attached to any of his lanternscopes by the use of two screws. When in position a series of different colours appear in rotation.

Price 5/-

477.—**The Chromoscope** (Adams & Co.)

An attachment to the Pantoscope for tinting purposes. Upon a hollow drum of glass a series of graduated tints are carefully painted. This is placed behind the slide and revolved as required, giving very beautiful sunrise, sunset, and night effects. It is especially suitable for marine slides, or for landscapes having a water foreground with plenty of sky room. The effects require to be seen to be believed.

Price 10/6.

478.—**Scanlan's Holder for Film Lantern Slides** (J. D. England).

The use of celluloid films for lantern slides has frequently been suggested, and by some workers adopted. One of the chief difficulties, however, has been the holding of them flat, necessitating practically the use of two covering glasses, thus making the slides quite as bulky, and even more heavy, than the ordinary glass ones. Mr. Scanlan, however, has introduced a new form of holder, in which the celluloid slides can be held flat and free from damage

during exhibition. The arrangement consists of two glasses, lantern-slide size, framed in neat metal frames, and hinged together at the bottom, the top having a light wire catch which falls over and holds the two together when the film slide has been inserted. By the use of a dozen of these holders several hundreds of these slides can be carried in very little space, and with very little weight. We say a dozen because, although the operation of filling is rapidly done, still, with some lectures with which rapidity of manipulation is a strong feature, it would be advisable to have a second assistant filling a number of slides and passing them on to the lantern operator. Of course, where extreme rapidity is not necessary, a couple of holders would meet all requirements. Beyond affixing a suitable mask to the face of the slide, nothing further in the way of binding is requisite, a saving of routine labour which will be much appreciated by slide makers.

Price 5/- per pair.

SLIDES.

VARIOUS. LECTURE AND OTHER SETS.

The following appeared in the "Optical Lantern Indispensable Handbook" :—

Lecture and Other Sets.

Africa
America
Asia and Australia
Castles, Cathedrals, and Abbeys
Educational
Entertainments, Pantomimes, &c.
Europe
General (Tours)
Great Britain
History
India
Scriptural and Religious
Services of Song
Stories, Tales, &c.
Temperance

Readings.

Pumphrey
Theobald
York

Various Slides.

Chameleon
Choreutoscope
" Giant
Chromatic Wheel
Chromotrope
" Band
" Interchangeable
Conundrum
Cycloidotrope
Dissolving and Effect
Kaleidotrope
Lever
Lightning Effect
Moon Rising Effect
Pandiscope
Panoramic
Rackwork
" Combination
Slipping
Snow Storm Effect
Wheel of Life

The following were described in "Photography Annual," 1891 :—

Colours and Effects.

Croydon Church	...Underhill
Forth Bridge	... "
Funny Showman	...Hughes
Humorous Animal	...Underhill
Paris Exhibition	... "
Picture Gallery	... "
Royal Homes	... "
Scotland	... "
Venice	... "

Educational.

Animals	...Wilson
British Army, Types of ...	... "
Daily, All about a	...York
Fisher Life	...Valentine
Heart, and how it beats ...	...York

Scenery, Tours, Places, &c.

Africa, East Coast	...York
Alhambra	...Wilson
Athens	... "
Barbados	...York
Ben Nevis and Observatory	...Wilson
Berlin	...York
Brussels	... "
Cambridge	...Wilson
Chatsworth and Haddon Hall ...	"
Chester and Neighbourhood ...	"
Derbyshire and the Peak	"
Dukeries and Sherwood Forest ...	"
Edinburgh	"
English Architecture	"
" Cathedrals	"
Fife	"
Forth Bridge	...Valentine
" "	...Wilson
Giant's Causeway	"
Glasgow and Clyde	"
Granada and Alhambra ...	...Valentine
Greenland	"
Highlands of Scotland ...	...Wilson
Holy Land	"
Homes of England	"
Isle of Man	...York
Jamaica	"
London, "Modern Babylon" ...	"
London, Round About ...	...Wilson

SCENERY, TOURS, PLACES, &c.—*continued.*

Lowlands of Scotland ... ...Wilson
Morocco ... ...Valentine
Naples, Bay of ... ...Fincham
New York to the White Mountains.York
North Cape ... ...Valentine
Norway ... ... Pumphrey
Oban to Skye ... ...Wilson
Orkney ... ...Valentine
Outer Hebrides ... ...Wilson
Oxford ... ... ,,
Perthshire ... ... ,,
Pompeii ... ...Fincham
Queen's Highland Home ... ...Wilson
,, Jubilee ... ...York
Rome ... ... Fincham
Rochester and Charles Dickens ...Wilson
Scotland, West Coast ... ... ,,
Shakespeare Country ... ... ,,
Shetland Isles ... ...Valentine
Stanley Expedition ... ...York
Sylvan Wye .. ..Valentine
Thames... ... ... ,,
Trinidad ... ...York
Turkestan ... ...York
Windsor Castle ... ...Wilson
Yorkshire ... ... ,,

STORIES, TALES, &c.

Brook ... ...Valentine
Charity Concert ... ... ,,
Cricket on the Hearth ... ...York
Crinoline Legend ... ... ,,
Difficulty about that Dog ... ...Pumphrey
Dora ... ...York
Enoch Arden ... ... ,,
Fishing Adventure ... ...Valentine
Fond and Foolish Parents... ...Pumphrey
Little Woodman ... ...York
May Queen ... ...Pumphrey
Minister and Breeches ... ... ,,
Prize Ox ... ...York
Road to Heaven ... ... ,,
Ruined Cottage ... ... ,,
Shooting Adventure... ... ...Valentine
Under Canvas ... ...Wilson
Women of Mumbles Head ...York
Wreck of Hesperus... ... ...Pumphrey

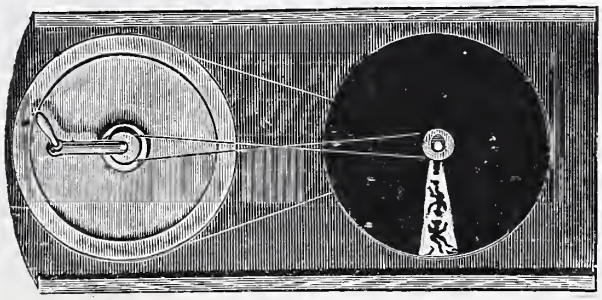
VARIOUS.

479.—**Gelatine Slides** (GELATINE SLIDE BUREAU).

The bureau is really a lending library of lantern slides. It is worked through the parcel post, and by this means the remotest village institute or Band of Hope, far from any railway station, can have a regular supply all the winter of effective slides, accompanied by an interesting MS. lecture, for a small subscription. The bureau has now in circulation a great number of sets, including travel, science, adventure, evangelistic sets for Sunday evening services, temperance sets, &c. The slides are printed on to gelatine sheets from blocks, &c. They are, of course, exceedingly light, as no glass is used at all.

480.—**"Athenæum" Slides** (ALBION ALBUMENISING CO.)

This company are getting ready to place a very complete lot of slides, both coloured and plain. They are on gelatine films, but so well done that I had to unbind the slides sent to find it out. The price will astonish us, I am told.



No. 481.

481.—**New Pattern Wheel of Life** (A. Pumphrey).

A slide which exhibits life and movement is always one that gives pleasure and satisfaction to an audience, but the price has hitherto stood in the way. Mr. Pumphrey has made a new pattern in which the advantages of the older and more expensive instrument are secured at half the price. The following improvements have at the same time been effected. A variety of designs are all made to work in the new wheel. The designs themselves are not on glass but on a light flexible medium which is not liable to break like glass, in being carried about. There is also a clever arrangement of a pulley wheel, kept in position by a spring. In old patterns it has always been difficult to make the string work correctly when the designs are changed, as the tension required must be very accurate. But in this new pattern the tension is automatically adjusted, and the pulleys attached to the design may also be of different sizes, to suit the subjects, or for other purposes.

Price, with one design, 10/- ; extra designs, 1/6 each.



No. 482.

482.—**Pumphrey's Film Slides** (A. Pumphrey).

A new series of film lantern slides, which possess one great advantage, they need no glass protectors, and yet are as flat as possible. This is accomplished by using a special beaded metal frame, which in binding the film draws it tight and true. Some idea of their lightness and saving in weight may be gleaned from the fact that four weigh only one ounce, and 50 can be sent by post safely packed for 4½d. The price is 9/- per dozen, and all his various sets may be had upon these films if so ordered. They are the best film lantern slides upon the market.

Lecture and Other Sets.

483.—**Scenery, Tours, Places, &c.**

Madeira (P. H. Fincham).

An entirely new series of 50, from negatives taken by himself. Some of the slides are exceedingly good. Commencing with the "Scot" S.S. leaving Southampton, we have Funchal from the ship, the beach, Bella Vista Hotel, natives, &c. Next, passing on by the Levada Tunnel and the Janella Valley, come views of Rabacal, St. Anna, St. Vicente, Santa Cruz, and Machico.

Germany (P. H. Fincham).

Like the foregoing, these are from new negatives quite recently taken. The series of 50 comprise Wiesbaden (2), Frankfort (1), Eisenbach (4), Wartburg Castle (2), Gotha, Erfurt and Weimar, Halle (2), Leipsic (4), Dresden (7), Wehlen Village and Basteri Rocks, Berlin (12), Charlottenburg, Potsdam (4), Harzburg (3), Goslar (2), Cassal, and Cologne Cathedral.

Melbourne (York & Son).

An Australian set of 52, consisting of views of streets, hotels, clubs, city buildings, churches, chapels, benevolent institutions, colleges, seminaries, monuments, suburban views, Government buildings, public gardens, &c., in and about the city of Melbourne.

The Giant's Causeway, Ireland (G. W. Wilson & Co.)

Thirty slides, illustrating that wonderful geological formation, accompanied by a very unscientific account of it.

English Cathedrals (G. W. Wilson & Co.)

A series of short readings, each on a single cathedral. They are all arranged in the same way. First comes a general or distinct view of the cathedral, then one or two near views, and the best interior views, with any specially interesting parts. Usually one or two interesting views of the town the cathedral is situated in are added. The recent additions to the series are:—

Gloucester Cathedral	..	..	..	24 slides.
Worcester ,,	..	..	..	22 ,,
Durham ,,	..	..	..	19 ,,
Westminster Abbey	..	..	..	15 ,,

The Great Pyramid (York & Son).

These are from the direct negatives of Prof. Piazzi Smyth, forty-eight in number, and consist of a very complete series of views, almost mathematical in quality, of this interesting antiquity.

Adelaide, Australia (York & Son).

This set of fifty includes views of the principal buildings, streets, lakes and bridges in parks, Botanic Gardens, the various jetties, &c.

A Thousand Miles up the Nile (G. W. Wilson and Co.)

Starting from Alexandria, a visit is made first to Cairo, of which a dozen views are shown, and then to the Pyramids and Sphinx. Then taking to the Nile, the principal points of interest (including fourteen of the various ruins of Thebes) are shown in their order until Aboo Simbel, immediately north of the Second Cataract, is reached. There the trip ends with a view of the immense Statue of Rameses II. carved out of the living rock. In the course of the lecture is shown a slide of the actual mummy of

this king—a monarch who is doubly interesting to us on account of his being the Pharaoh of the oppression. We are thus able to look on the veritable features of the Pharaoh whose heart was hardened against the Jews, and who played such an important part in Biblical history, four thousand years before the Christian Era. 70 slides.

The Paradise of the Pacific (Wilson & Co.)

A trip to the great Hawaiian Volcano and the Lepers' Home. Views of Honolulu, the capital of the Kingdom; portraits of the Hawaiian royal family, types of natives in various dresses, and specimens of different fruit are first shown. Then a short trip is made through the islands, visiting the Leper Settlements of Molokai, and finally visiting the great Crater of Kilauea Volcano. Among other interesting pictures in this set is a portrait of the late Father Damien on what eventually was his deathbed, and a series of views of a sugar plantation. 58 slides.

Antiquities at Athens (Wilson & Co.)

A series of views of the chief antiquities at Athens, the Acropolis, the Parthenon, &c., with a plan showing the sites of the various buildings. 18 slides.

The Maritime Alps and Monaco (G. W. Wilson and Co.)

A set of 70 views in the country indicated with instantaneous pictures of characteristic groups, &c.

The French Riviera and Monaco (G. W. Wilson and Co.)

A complementary set of 70 slides to the one described above. Both sets are quite distinct and from different plates.

One Thousand Miles up the Congo (York & Son).

Commences with a map and views of the river mouth, then passes up the country alongside, giving views of natives, graves of kings, rock and jungle scenery, oil palms, various trees, animals, musical instruments, &c. 50 slides.

The Beauty Spots of the Riviera (York & Son).

Altogether there are 111 slides divided into the following sections:—

Nice and Ville Franche..	35 slides.
Monaco	17 ,,
Monte Carlo	18 ,,
Mentone and Roquebrune	20 ,,
San Remo	7 ,,
Genoa	14 ,,

The Holy Land (G. E. Franklin).

An entirely new set of 60 slides. Commencing at Jaffa, it passes on to Jerusalem, Bethany, Bethlehem, Hebron, Dead Sea and River Jordan, Jericho, Samaria, Nazareth, Mount Tabor, Tiberias, Damascus, Cedars of Lebanon, and ends with three of Baalbec.

484.—Educational, Historical, &c.

The Architecture of Scotland (G. W. Wilson & Co)

This set traces the gradual rise and development of Scottish Architecture from the earliest period down to the present day. It forms a companion set to the one on "The Architecture of England," published last year. 50 slides.

KINGSLEY'S HOME AT EVERSLEY (G. W. Wilson & Co.)

A series of views of Eversley Rectory and the Rectory Garden, one with the famous writer himself in the foreground, one or two of Eversley Church, and one of Kingsley's Grave. 8 slides.

THE HOME OF GRACE DARLING (G. W. Wilson & Co.)

A description of the birthplace of this heroine in humble life, with views of the scenery amid which she lived and died. A slide of Grace Darling from the best portrait in existence is given. 20 slides.

ANIMAL STUDIES (G. W. Wilson & Co.)

Twenty new studies, chiefly from the collection of Charles Reid, of Wishaw.

SPORTS AND ATHLETICS (G. W. Wilson & Co.)

These are chiefly from the wonderful negatives by Mr. Louis Meldon. A series of twenty-four slides from instantaneous negatives of tennis, bicycling, running, cricket, leaping, diving, coaching, yachting, golf, &c. 24 slides.

SCENES FROM THE LIFE OF JOHN WESLEY (York & Son).

A very complete set of fifty slides, commencing with portraits, and passing on through Charterhouse School, Christ Church College, Oxford scenes, &c., to the many incidents of his life. Towards the end are many interesting slides, such as the last entry in his account book, &c.



TYPES OF THE BRITISH ARMY AND NAVY (W. Gregory & Co.)

Both in character and extent, but particularly in the latter direction this series is quite unique. The slides are excellent specimens of work,

both in negative and slide producing, and the effect upon the sheet is most striking. A full list is out of the question, and big as it is already, owing to the size of the subject, it is not yet complete. But those already finished give life-like representations of our sailors and soldiers, their dress and equipments.

Ice Crystals (Martin & Co.)

This is a slide from the photo referred to at No. 384.

The Manchester Ship Canal (Edward Ward).

This is a series of 5,000 at present, and is still growing. Many of them are already in use in colleges for teaching purposes. The samples sent are very good indeed.

Educational Series (Edward Ward).

Mr. Ward has for some years devoted considerable time to special work in slides for technical education. The various sets illustrate the following:—

Cryptogamic Botany, including Diatoms, Alga Fungi, Lichens, Ferns.
Phanerogamic Botany, including Flower Studies, Trees, &c.
Pond Life.
Insect Life, including Parasites, Diptera, Lepidoptera and Coloptera.
Marine, including Foraminifera, Zoophytes, Sponges, Crustacea, Mollusca, and Fishes.
Arachnida.
Reptilia, including Frogs, Newts, Snakes, &c.
Ornithology.
Conchology.
Osteology, including Skeletons, Skulls, &c.
Physiology and Pathology.
Geology and Petrology.
Archæology.
Astronomy and Meteorology.
Chemistry and Physics.
Art and Architecture.
Volcanoes, Glaciers, and Geysers.
Technical, including Mining, Cotton Spinning, Dyeing and Printing, &c.
Isle of Man, Popular and Geological.

The Stations of the Cross (York & Son).

The Passion of Jesus. A set of 14 slides.

Hop-picking in Kent (York & Son).

Twelve views of the Coster's annual picnic, the camp, picking, measuring and drying the hops, waiting for supper, after supper, Sunday morning, &c.

An Hour with the Church of England (York & Son).

A series of 50 dealing with all the abbeys, cathedrals, churches, &c., of note in the history of the Church of England.

Easter, Ascension, and Whitsuntide (York & Son).

This comprises 14 scriptural views and 14 appropriate hymns.

Lent and its Events (York & Son).

A similar series of 12 views and 12 hymns.

485.—Stories, Tales, Illustrations of Authors, etc.

Temperance (York & Son).

"Ten Nights in a Bar Room"	24
"In His Keeping"	10
"The Bridge of Sighs"	4

The Parish Clerk (York & Son).

Illustrations to the story by Chas. Dickens, about Mr. Nathaniel Pipkin and the bewitching Miss Maria Lobbs. Twelve slides.

The May Queen (York & Son).

A series of ten slides to illustrate Tennyson's well-known poem commencing "Call me early, call me early, mother dear."

Jane Conquest (York & Son).

If there is any lantern story more popular than another, it is that of how Jane Conquest tolled the bell. In fact, the firm state in their list "that the popular set Jane Conquest being injured by constant use, are retaken with improvements." The present is, therefore, a new set entirely, and the most popular story ever illustrated by means of the lantern. Eighteen slides.

The Fireman's Wedding (York & Son).

As a recitation this has held and still holds its sway. The slides, seven in number, are to illustrate it by means of the lantern.

Aurelia's Unfortunate Young Man (York & Son).

These five are from new and original drawings to illustrate Mark Twain's most humorous recital of the accidents that happen to Aurelia's sweetheart.

The Bells of Shandon (York & Son).

A set of eight slides to illustrate the story by Father Prout.

486.—Humorous and Various.

Cats at Play (G. W. Wilson & Co.)

Humorous photographs from life of various scenes in the life of cats. Five slides.

Cloud and Water Effects (G. W. Wilson & Co.)

Six new subjects.

Snow and Frost Scenes (G. W. Wilson & Co.)

Twelve new subjects.

Whimsicalities (G. W. Wilson & Co.)

Three grotesque pictures—"Awful Warnings" to amateur photographers against the abuse of short-focussed lenses. There is no reading, as the titles explain themselves. Three slides.

Portraits from Life (G. W. Wilson & Co.)

Twelve new subjects, including Cardinal Manning and the Duke of Clarence.

Tippoo: A Tale of a Tiger (G. W. Wilson & Co.)

Shows how Dr. Delaney's generosity to the Zoological Society of Dundrum leads him at first into trouble, but finally into bliss in the arms of his Julia (38 slides).

"The Demon Cat" (G. W. Wilson & Co).

Shows the adventures of a cat on board a man-o'-war, and its final unhappy despatch. Twenty-six slides.

Kamdene, Barnsbury and Dalston's Tour in the North (G. W. Wilson & Co.)

The holiday tour of three London "city gents" in the West Coast and their wonderful adventures. 28 slides.



SNAP SHOTS (G. W. WILSON & Co.)

These are a series from the hand camera productions of the compiler of this section. The two illustrations are samples of them.

THE ABSENT MAN (York & Son)

A series of twelve slides showing the awful consequences of being absent-minded.

THE WORLD INVERTED (York & Son).

Such studies as the boot blacking, the donkey riding, the pony driving, the deer stalking, &c. A sarcastic and withal a truthful *exposé* of our ideas of the treatment of animals. 12 slides.

CLERGYMAN'S ADVENTURES IN NORWAY (York & Son).

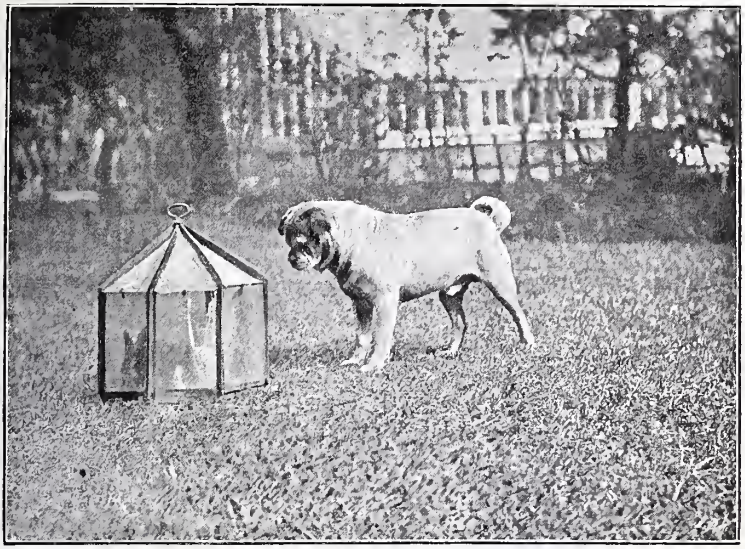
The awkward affair that the Rev. Timotheus Sporway had with his trousers. Six slides.

CAT STUDIES (York & Son).

A series of 12 slides of cats at breakfast, four o'clock tea, over the garden wall, the serenade, the young recruit, &c.

PHOTOGRAPHY AND ITS VICTIMS (A. Underhill).

The celebrity and the amateur, photographing the lodging house cat, an unappreciated model, a difference of opinion, &c. Six slides.



THE HAT TRICK (A. Underhill).

The trap, the victim, the kick, and "oh!" Four slides.

THE AMATEUR SKATIST (A. Underhill).

The adventures of Green, who knows a quiet pool whither he may retire to study the art. Four slides.

THE BOYS AND THE BOBBY (A. Underhill).

Keep the pot a-boiling, ye enemy, ye peril and downfall of the bobby. Four slides.

HUNTING YE HARE (A. Underhill).

Adventures in shooting a hare, which turns out to be an old woman's cat. Five slides.

TALE OF A SNOWBALL (A. Underhill).

Tummus wants to know "who throwed that snowball?" and blames the parson, returning the throw with interest, the boys over the wall enjoying the mistake. Four slides.

DAT OLD CRISERMAS GOOSE (A. Underhill).

The adventures of Old Jess and Young Jess in catching the goose to kill it for the Christmas dinner. Ten slides.

A SAUSAGE STORY (A. Underhill).

The customer orders the butcher to go on cutting until told to stop. Whilst this is in progress a friend pops in; a confidential chat ensues, but the butcher goes on. Finally, something like a hundredweight is cut, and the customer has to pay. Six slides.

SANDRINGHAM HALL (A. Underhill).

Six slides of the residence of T.R.H. the Prince and Princess of Wales by day, moonlight, winter, on fire (Nov. 1891), and two portraits. Issued coloured only.

STRANDING OF S.S. "EIDER" (Charles Knight).

These are referred to in Part IX., Various, No. 384. They may all be had as lantern slides.

OPTICAL LANTERNS,

APPARATUS AND SLIDES.

CHATHAM PEXTON,

DISSOLVING VIEW ARTIST & MANUFACTURER,

HAS, FOR THE PAST TWENTY YEARS, SUPPLIED THE

LEADING MISSIONS, SCIENTIFIC INSTITUTIONS, CLERGYMEN, LECTURERS, OPTICIANS, AND AMATEURS

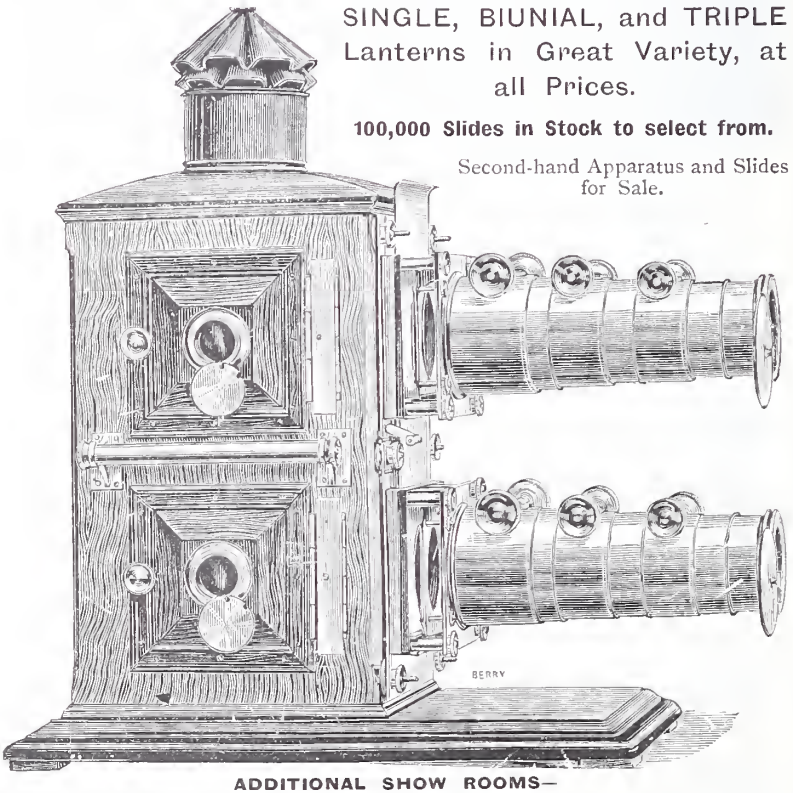
WITH

HIGH-CLASS GOODS AT MODERATE CHARGES.

SINGLE, BIUNIAL, and TRIPLE Lanterns in Great Variety, at all Prices.

100,000 Slides in Stock to select from.

Second-hand Apparatus and Slides for Sale.



ADDITIONAL SHOW ROOMS—

FIRST FLOOR, GARFIELD BUILDINGS,

150, HOLBORN, LONDON, E.C.

(ENTRANCE, FIRST DOOR ON THE RIGHT IN GRAY'S INN ROAD.)

(*See following page.*

CHATHAM PEXTON.

ALL THE LATEST NOVELTIES FOR THE SEASON.

Complete Lantern Outfits

AT ALL PRICES.

FROM THE *ELOCUTIONIST*.

"DISSOLVING VIEWS.—Among enterprising artists who ceaselessly endeavour to provide requisites for entertainment and instruction is the well-known Mr. Chatham Pexton, of Gray's Inn Road. This gentleman is open to provide everything efficiently and cheaply in connection with such delightful recreation. Mr. Pexton is always prepared to give advice to intending purchasers, and it is a question if patrons will anywhere find the same benefits as Mr. Pexton can offer, his long and studious experience, his love of the art, his practical methods and moderate prices being pre-eminently deserving of attention."

New Lecture Sets on Australia, Madeira, Germany, &c.

New Temperance Sets.—Little Jamie, For Mother's Sake, Ten Nights in a Bar Room, In His Keeping, &c., &c.

New Life Model Sets.—Bells Across the Snow, One Winter's Night, Village Blacksmith, The Good Samaritan, Lost Gip, &c.

Services of Song, &c.

Hundreds of New Comic Sets.

Slides produced from Professional or Amateurs' own Negatives and Painted in three different styles, if desired. Lists Free.

CHATHAM PEXTON is the oldest Practical Worker in the Trade.

WHOLESALE, RETAIL, EXPORT.

Shipping Orders receive immediate attention, and are shipped within 7 days of receipt.

ADDITIONAL SHOW ROOMS—

FIRST FLOOR, GARFIELD BUILDINGS,

150, HOLBORN, LONDON, E.C.

(Entrance, FIRST DOOR on the RIGHT in GRAY'S INN ROAD.)

[See preceding page.

The OLDEST Penny Photographic Paper in the World.

EVERY THURSDAY. ONE PENNY.

Photography

The Journal of The Amateur, The Profession and The Trade.

IS

ACCURATE, NEWSY, ENTERPRISING.

Editor—HENRY STURMEY.

EDITORIAL CONTRIBUTORS:

Capt. W. de W. ABNEY, C.B., F.R.S.; CHAS. H. BOTHAMLEY, F.C.S., F.I.C.; Prof. W. K. BURTON, C.E.; GEORGE DAVISON; CHAPMAN JONES; ANDREW PRINGLE FRANK M. SUTCLIFFE.

The Special Features are:—Scientific and Technical Articles by well-known writers; The Question Box, with a series of Prizes for the senders of replies; Prize Competitions; Snap Shots; Items of Interest; Interviews with Prominent Members of the Trade; and the Price - One Penny.

A SPECIMEN COPY WILL BE SENT GRATIS & POST FREE.

WHAT THEY THINK OF IT.

"*Photography* is a positive success"—*Wilson's Photographic Magazine.*

"A stirring, newsy journal, which bids fair to a successful career."—*St. Louis Photographer.*

"It is very interesting, and far ahead of the other photographic papers."—GERALD STONEY, Gateshead.

"I look upon *Photography* now as part of my weekly diet, as it suits my constitution."—MOORE, Dartford.

"When I have read the pages of one week issue I am anxious to see the next."—F. LEWIS Derby.

"Your new journal, like the 'Pickwick' pen, 'comes as a boon and a blessing to men.'"—J. C. CHRISTIE, Old Cathcart.

"You may be sure I shall prize this my *first* silver medal, and I shall not want to look at it to remind me of *Photography*, as I always have this paper for dessert on Thursdays."—J. W. EVANS, Wolverhampton.

"I think your paper a marvel of cheapness. I had great difficulty in getting it regularly, or even at all, at first; but since I have succeeded I think all my early trouble has been liberally repaid."—A. C. ANDERSON, Arbroath.

"I must say *Photography* is proving a decided success; it seems to be improving every week. Since taking in your paper I have entirely given up a journal which is published on the same subject, which, though more mature in years, still takes a leaf from its infant friend."—M. TILLICOUTHY.

LONDON: ILIFFE & SON, 3, ST. BRIDE STREET, E.C.

AND ALL BOOKSELLERS AND BOOKSTALLS.

Editorial and Advertisement Offices: 19, HERTFORD STREET, COVENTRY.

Section VII.

THE PHOTOGRAPHIC SOCIETIES

OF THE

UNITED KINGDOM.

THOMAS'S

Complete Catalogue

OF

PURE CHEMICALS, SPECIALITIES, AND ALL PHOTOGRAPHIC REQUISITES,

Manufactured by the Firm for the last 40 years,

Post Free on application.

THOMAS'S

CELEBRATED DEVELOPERS

HYDROKINONE (Bottles Rubber-stoppered), in Travelling Cases, two ½ pints, concentrated	3/-
PYRO-AMMONIA, in Travelling Cases	3/- and 4/6
" " " " For Lantern Plates	3,9
PYRO-POTASH " "	4/-
FERROUS OXALATE	3/6

R. W. THOMAS & Co.,

LIMITED,

10, PALL MALL, S.W.

Telegraphic Address: "RUHTRA, LONDON." Telephone No. 35,037.

[See following pages.

THOMAS'S

Special Cyclist

OR

DETECTIVE CAMERA PLATES.

28 W.

Quarters, 5 x 4in., and 12 x 9 cm.

ON THIN LANTERN PLATE GLASS.

FOR PRICES see Page xx.

NOTE THE REDUCTION IN PRICE

OF THE

Pall Mall Celluloid Films

WILL BE FOUND SUPERIOR TO ANY OTHER BRAND.

Cyclist, Thickly Coated Landscape. Thickly Coated Extra Rapid.

At the same prices as our Thickly-coated Plates.

See Page xix.

R. W. THOMAS & Co., LTD.,

10, PALL MALL, LONDON, S.W.

Telegraphic Address: "RUHTRA, LONDON." Telephone No. 35,037.

[See preceding and following pages

THOMAS'S PLATES

(THE PALL MALL.

SIZES AND PRICES PER DOZEN.

Inches.	Cyclist Thickly-coated. 28 W.	Thickly-coated Landscape. 18 W.	Thickly-coated Extra Rapid. 25 W.	Extra Rapid. 25 W.
	s. d.	s. d.	s. d.	s. d.
4¼ × 3¼	1 6	1 6	1 6	1 0
5 × 4	2 4	2 4	2 4	1 7
6½ × 4¾	3 6	3 6	3 6	2 3
7½ × 5	4 6	4 6	4 6	3 6
8½ × 6½	6 6	6 6	6 6	4 3
9 × 7	7 6	7 6	7 6	5 0
10 × 8	10 0	10 0	10 0	7 3
12 × 10	14 6	14 6	14 6	10 6
15 × 12	23 0	23 0	23 0	18 0

Centimètres.	Cyclist Thickly-coated. 28 W.	Thickly-coated Landscape. 18 W.	Thickly-coated Extra Rapid. 25 W.	Extra Rapid. 25 W.
	s. d.	s. d.	s. d.	s. d.
9 × 12	1 10	1 10	1 10	1 2
13 × 18	4 3	4 3	4 3	2 9
15 × 21	5 9	5 9	5 9	3 9
18 × 24	7 6	7 6	7 6	5 0
21 × 27	10 9	10 9	10 9	7 6

Specially adapted for use in India and other Hot Climates.

R. W. THOMAS & CO.

(LIMITED),

10, Pall Mall, London, S.W.

Telegraphic Address : "RUTHRA, LONDON." Telephone No. 35037.

[*See preceding and following pages.*

COLLODIO-BROMIDE ENTIRELY SUPERSEDED

BY THOMAS'S

LANTERN OR TRANSPARENCY EMULSION.

The finest thing yet achieved.

For all kinds of Transparency Work or Opals, Micro-photography, Enlarging, or Copying, nothing better can be desired.

Lantern Plates 3¼ x 3¼in., 1/- per dozen on thin glass. All other sizes coated and charged at Pall Mall Extra Rapid prices.

Opal Glass, Flashed or Pot, and a fine Ground Glass coated at shortest notice.

All Colours are obtainable with the greatest facility without toning.

PRICES.

	3¼ x 3¼, on thin glass, 1/- per dozen.							
4¼ x 3¼	Ordinary Glass	...	...	...	1/- per doz.;	Fine Ground Glass,	1/6 per doz.	
6½ x 4¼	,,	...	...	...	2 3	,,	,,	,,	3 3	,,
8½ x 6½	,,	...	...	...	4 3	,,	,,	,,	6/-	,,
10 x 8	,,	...	...	...	7 3	,,	,,	,,	9 7	,,
12 x 10	,,	...	...	...	10 6	,,	,,	,,	14 6	,,

THOMAS'S CELEBRATED

"PALL MALL" OPAL PLATES.

PRICES.

4¼ x 3¼	...	...	...	...	...	...	...	...	Half Dozen,	1/-	One Dozen,	1 6
6½ x 4¼	...	...	...	...	...	...	...	...	,,	2 -	,,	3 6
8½ x 6½	...	...	...	...	...	...	...	...	,,	3 6	,,	6 6
10 x 8	...	...	...	...	...	...	...	...	,,	5 6	,,	10/-
12 x 10	...	...	...	...	...	...	...	...	,,	7 6	,,	14 6

R. W. THOMAS & CO.,

LIMITED,

10, PALL MALL, LONDON, S.W.

Telegraphic Address "RUHTRA, LONDON." **Telephone No. 35037.**

[See preceding pages.

SECTION VII.

THE PHOTOGRAPHIC SOCIETIES OF THE UNITED KINGDOM.

IN compiling the following particulars of Photographic Societies the utmost care has been taken to ensure completeness and accuracy. No time, trouble, or expense has been spared in the matter, as many as four or five communications having been made in many cases with the secretaries for the purpose of obtaining all the information required. We think, therefore, that we may safely assert that the list is the most accurate and complete ever published, and that if any societies do not appear in our pages they are either "dead as a door nail," or have been formed since our pages went to press.

Aberdare Photographic and Scientific Society,

Formed on October 19th, 1890, has its headquarters at the back of the Welsh Harp Inn. Its day of meeting is Wednesday, and the subjects to be taken up during the present year are photography for beginners, magnetism and electricity, chemistry, &c. Excursions in connection with the Naturalists' Society are arranged during the summer, and tourists are allowed to change plates in the dark room free of charge.

PRESIDENT—H. C. Lewis.

VICE-PRESIDENTS—Dr. Hutchesson, D. P. Davies, J.P., A. S. Please, and L. Acomb.

COUNCIL—J. Finnucane, A. E. Dewsbury, Iago Lloyd, J. Griffiths, D. Tudor Williams, and G. George.

HON. TREASURER—L. Acomb, Lloyd's Bank.

HON. SECRETARY—D. P. Davies, 17, Commercial Street, Aberdare.

Aberdeenshire Amateur Photographic Society.

Formed on October 13th, 1891, holds its meetings at 35a, Union Street, Aberdeen, on the last Tuesday of each month at 8 15 p.m., and its membership is open to all amateurs, ladies and gentlemen, and its members are scattered all over the county, but chiefly near Aberdeen. Dark-room accommodation can be obtained (by visitors) by application to the secretary in Aberdeen.

PRESIDENTS—Honorary, Dr. J. McKenzie Davidson; ordinary, W. Todd Moffatt.

VICE-PRESIDENTS — Honorary, Thomas Ferguson; ordinary, J. Clark and W. G. Lindsay.

COUNCIL—The above and Alex. McKilligan and James Main.

HON. SECRETARY AND TREASURER—G. Brodie, 2, Powis Terrace, Aberdeen.

Abney Camera Club.

Formed in 1888, is a private club, holding meetings on alternate Fridays at the houses of members in rotation.

HON. SECRETARY—F. H. Leeds, F.C.S., 26, East Bank, Stamford Hill.

Albany Institute Amateur Photographic Society.

Dates from 1883, and has its headquarters at the Albany Institute, Albany Road, Camberwell, S.E. Its meetings are held on alternate Tuesday evenings, commencing Jan. 5th.

PRESIDENT—G. S. Martin.

COUNCIL—G. H. A. Bucknole, H. Harvey, and W. Rhodes.

LIBRARIAN—W. Fraser.

HON. TREASURER—A. B. Smith.

HON. SECRETARY—Alfred B. Gee, 3, Welby Street, Camberwell, S.E.

Amateur Photographic Association.

Established in 1861, has its offices at 58, Pall Mall, London, S.W. Only meetings of the Council are held, and these at no fixed time. It has for its object the furtherance and encouragement of photography by means of the exhibition of works of amateur photographers, the interchange and distribution of the results of their labours, and an annual distribution of prizes.

PRESIDENT—His Royal Highness the Prince of Wales.

VICE-PRESIDENTS—His Royal Highness the Duke of Cambridge, K.G., his Highness the Duke of Teck, G.C.B., &c., the Most Noble the Marquis of Drogheda, Gen. the Right Hon. the Lord de Ros, the Right Hon. the Earl of Rosse, F.R.S., James Glaisher, Esq., F.R.S., F.R.A.S., &c.

COUNCIL—Sir J. Whittaker Ellis, Bart., M.P., Sir Spencer Maryon Wilson, Bart., Charles Stevens, M.A. Oxon, W. D. Howard, F.I.C., Walter Wood, F.R.G.S., W. S. Hobson, John Aird, M P., R. O. Milne.

HON. SECRETARY—Arthur James Melhuish, F.R.A.S. & F.R. Met. Soc.

ASSISTANT SECRETARY—A. Newton Melhuish.

Amateur Photographic Field Club.

Formed in 1852, holds monthly outings during the summer, and indoor meetings monthly during the winter. The date of the annual meeting is February.

PRESIDENT—C. Burton Barber.

HON. SECRETARY AND TREASURER—B. Gay Wilkinson, jun., 151, Bermondsey Street, London, S.E.

Arbroath Amateur Photographic Association.

Dates from November, 1890, has its headquarters at Brothock Bridge, and its days of meeting on the last Tuesday of the month. A dark room is provided for members, which strangers can have the use of when visiting the district.

PRESIDENT—Robert Moodie.

VICE-PRESIDENT—George R. Reid.

COUNCIL—W. Webster, D. Kyd, A. Malcolm, Robert McLush.

HON. SEC. AND TREASURER—E. J. Ritchie, Clifburn, Arbroath.

Ashton-under-Lyne Photographic Society.

March, 1891, saw its beginning. Its headquarters are in Henry Square, and they are open daily from 9 a.m. to 10 p.m. The club premises include dark room, reading room, lecture room, and during the winter season meetings are held weekly, for the reading of papers, demonstrations, and lantern exhibitions.

PRESIDENT—Dr. A. Hamilton.

VICE-PRESIDENTS—J. W. Kennorthy, C. E. Redfern, J.P., Rev. H. J. Palmer, Major Bradley.

COUNCIL—W. Chadwick, T. Glazebrook, W. Greenwood, B. Hall, W. Leigh, R. Matthews, J. H. Storey, Geo. Weild.

HON. TREASURER—R. T. Marsland.

HON. SECRETARY—Geo. H. Dean, 8, Egmont Terrace, Stalybridge.

Barnstaple and North Devon Photographic Society.

Formed October, 1890, has its headquarters at the North Devon Athenæum, Barnstaple, and meets on the first Wednesday in the month. It is making a special feature of survey work, and, in conjunction with other Devonshire societies, hopes to make a complete survey of Devon.

PRESIDENT—Rev. Thos. Newton, LL.D.

VICE-PRESIDENT—William J. Ridd.

COUNCIL—J. J. H. Sanders, L.D.S., W. M. Jones, A. Walpole, and officers.

HON. SECRETARY AND TREASURER—Arthur C. King, Hills View, Barnstaple, North Devon.

Bath Photographic Society.

Formed in 1888, has its headquarters at the Royal Literary and Scientific Institution, Terrace Walks, and meets on the last Wednesday in each month. During the summer months excursions are substituted for indoor meetings. The society's commodious dark room may be used by amateur tourists on a payment of 2s. 6d. per month, which constitutes temporary membership.

PRESIDENT—AUSTIN J. KING.

VICE-PRESIDENT—Philip Braham, F.C.S., &c.

COUNCIL—W. Pumphrey (permanent member), E. J. Appleby, A. E. Perren, G. F. Powell, Rev. E. A. Purvis, Canon Williams, D. Williams.

HON. SECRETARY AND TREASURER—W. Middleton Ashman, 12a, Old Bond Street, Bath.

Bedford and District Camera Club.

Formed March, 1890. Its headquarters are at the Bedford Library, and meetings are held monthly during the winter. It is exclusively an amateur society.

PRESIDENT—Deputy-Surgeon-General A. H. Beaman.

COUNCIL—President H. W. Stewardson, Rev. H. V. Macdona, M.A., C. E. Wareing, W. O. Kirby, and the Hon. Secs.

JOINT HON. SECRETARIES AND TREASURERS—E. Hill and Alex. Kirby, 8, Harpur Place, Bedford.

Birkenhead Photographic Association.

Dates from 20th November, 1884. Its place of meeting is the Young Men's Christian Association, Grange Road, and meetings are held on the second Thursday in each month.

PRESIDENT—G. A. Carruthers.

VICE-PRESIDENT—W. H. Hunt, D. Mus. Lond.

COUNCIL—Paul Lange, A. F. Stanistreet, G. Latimer, C. B. Reader G. E. Thompson, H. B. Millar, W. T. Briggs, A. F. Edwards, and Sylvester Parry.

HON. TREASURER—W. A. Brown.

HON. SECRETARY—F. Hope-Jones, Prenton, Birkenhead.

Birkenhead Y.M.C.A. Camera Club.

Formed in May, 1891, has its headquarters at Birkenhead, and meets on the first Friday in the month.

PRESIDENT—Dr. Stansfield.

COUNCIL—W. J. M. Richardson, T. Baty, C. R. Haigh, and J. C. Walker.

HON. SECRETARY AND TREASURER—H. E. Gem, 27, Kingsland Road, Oxton, Birkenhead.

Birmingham Photographic Society.

Formed in 1884, has its headquarters at the Colonnade Hotel, New Street, Birmingham. Its days of meetings are the first and last Thursday in each month, and social evenings held in clubroom every Tuesday.

PRESIDENT—J. B. Stone, J.P.

VICE-PRESIDENTS—J. J. Button, W. J. Harrison, F.G.S, E. H. Jaques, and G. F. Lyndon.

COUNCIL—F. S. Goode, W. Jones, A. R. Longmore, A. J. Leeson, G. A. Thomason, J. Taylor, G. Wilkes, and E. Underwood.

HON. TREASURER—W. Roake.

HON. SECRETARY—J. T. Mousley, 26, Portland Road, Edgbaston.

Blackburn and District Photographic Society.

Dates from the 3rd February, 1890, its headquarters are at Mitchell's Temperance Hotel, 36, Northgate, Blackburn, and its days of meeting the last Tuesday of each month at Blackburn, and the second Tuesday of each month at Darwen in the winter season. The society has a studio with small dark room for the use of members in Railway Road, Darwen, and excursions to places of interest are arranged during the summer months.

PRESIDENT—Major Baron.

VICE-PRESIDENTS—Peter Jackson and James Cavis.

COUNCIL—S. J. Mitchell, H. P. Tattersall, W. B. Burrows, and R. Timperley.

HON. TREASURER—A. P. Garland.

HON. SECRETARY—W. Y. Gowans, 27, King William Street, Blackburn.

Blackheath Camera Club.

Formed on the 29th October, 1891. Its headquarters are at the Art Club, Bennett Park, Blackheath. It meets on Tuesdays and Wednesdays fortnightly, for the cultivation of photography and the advancement of any branch of science or art kindred to the same. Ladies as well as gentlemen are admitted as members.

PRESIDENT—W. H. M. Christie, M.A., F.R.S., F.R.A.S. (Astronomer Royal).

VICE-PRESIDENTS—Ernest Clarke, M.D., B.S., and J. T. Field, L.Mus.T.C.L.

COUNCIL—Wm. F. Butcher, F.C.S., Edmund S. Dashwood, M.R.C.S., W. Claude Johnson, M.Inst.C.E., F.R.A.S., Rev. W. P. McDonald, M.A., Samuel E. Phillips, Rev. W. H. K. Soames, M.A., F.R.A.S., Henry Wayland.

HON. CURATOR—William Farrington.

HON. TREASURER—A. W. Young.

HON. SECRETARY—Thos. B. Earle, The Cottage, Handen Road, Lee, Kent.

Bolton Camera Club.

Dates from November 20th, 1889, has its headquarters at the Studio, 21a, Bury New Road, Bolton, and its day of meeting on the fourth Wednesday in each month in winter, and last Wednesday in each month during summer. Members have the use of dark room and dishes at any time, free of cost, and may also have use of studio for portrait work at a small extra charge.

PRESIDENT—J. Johnston, M.D.

COUNCIL—J. Turner, Jonas Royle, Walter Russell, Jos. Berry, Albert Harper, and T. Parkinson, jun.

HON. TREASURER—James Leach.

HON. SECRETARY—Thos. Parkinson, sen., 331, St. Helen's Road, Daubhill, Bolton.

Bolton Photographic Society.

Formed in 1879, its headquarters are at 10, Rushton Street, and it meets on the first Tuesday in each month. The club possesses a dark room, which is free to any tourist when introduced by a member.

PRESIDENT—J. R. Bridson.

VICE-PRESIDENTS—E. N. Ashworth, W. Knowles, B. H. Abbatt, W. Banks, I. Boothroyd, R. Harwood, T. Parkinson, and John Taylor.

COUNCIL—T. Davies, C. J. P. Fuller, R. Flintoff, A. Harper, Dr. Johnstone, J. Leach, J. E. Austwick.

HON. TREASURER—C. K. Dalton.

HON. SECRETARY—C. A. Mackechnie, M.B, &c., 355, Blackburn Road, Bolton, Lancashire.

Bournemouth Society of Natural Science—Photographic Section.

Formed October, 1890, has its headquarters at the Fine Arts Gallery, 76, Old Christchurch Road, and its days of meeting on alternate Wednesdays. Members of other photographic societies are admitted as members during their stay in Bournemouth upon presentation of membership cards.

PRESIDENT—Dr. Hyla Greves.

VICE-PRESIDENT—The Rev. J. R. Husband, M.A.

COUNCIL—The Rev. G. H. West, D.D. (President B.S. of Natural Science), S. Hardwick (Sec. B.S. of N.S.), P. H. Price, Dr. Cory, G. H. Piercy, and Dr. Schofield.

HON. TREASURER—Mr. Dolamore.

HON. SECRETARY—William Jones, 203 and 205, Old Christchurch Road, Bournemouth.

"Boys' Own" Postal Photographic Club.

Formed in 1890 for the circulation of prints amongst members, and criticisms thereon. The number of members is about 17, and the maximum is 20.

HON. SECRETARY—J. E. Hardwich, 6, Gloucester Terrace, Weymouth.

Bradford Photographic Society.

Formed September, 1884, its headquarters are at 7, St. George's Chambers, Westgate, Bradford, and it has its meetings every alternate Thursday from March 10th.

PRESIDENT—Isidor Sonnenthal.

VICE-PRESIDENTS—Walter Leach, F.C.S., W. H. Scott.

COUNCIL—Rev. T. Mellodey, M.A., W. Judson, J. Binns, Geo. Firth, F. J. R. Sutcliffe, J. P. Burgess, W. S. Smith, W. Halstead.

HON. SECRETARY AND TREASURER—F. B. Pickles, 15, Beech Grove, Pollard Lane, Bradford.

Brechin Photographic Association.

Dates from October 4th, 1888. Its headquarters are at 14, St. Mary Street, Brechin, and it meets the third Wednesday of each month at 8.15 p.m. from September to May. Its rooms at St. Mary Street are open to visitors, and the use of the dark room and reading room is granted to strangers at the nominal charge of 1s. per month.

PRESIDENT—W. Shaw Adamson.

VICE-PRESIDENTS—Geo. Mackie, A.Ph.S., and Henry Braid.

COMMITTEE—W. Ferguson, J. S. Buchanan, W. Dakers.

CURATOR—J. C. Middleton, Market Street, Brechin.

HON. TREASURER—A. Innes, St. Mary Street, Brechin.

HON. SECRETARY—James D. Ross, 6, High Street, Brechin, N.B.

Brighton and Sussex Natural History and Philosophical Society (Photographic Section).

Dates from March 25th, 1892, has its headquarters at the Free Library and Museum, Brighton, and its day of meeting on the first Friday in the month.

CHAIRMAN—D. E. Caush.

COMMITTEE—A. H. Conder, W. W. Mitchell, J. Hunter Graham, G. Foxall, and T. P. Slingsby Roberts.

HON. SECRETARY—Dr. Harrison, 98, Western Road, Brighton.

Bristol Camera Society.

Formed in 1886, has its headquarters at St. Augustine's Parade, Bristol. Its days of meeting are the second and fourth Friday in each month.

PRESIDENT—Harvey Barton.

VICE-PRESIDENTS—E. H. Cook, Ph.D., F.R.C.S., and F. T. B. Logan, M.R.C.S., L.R.C.P.

COUNCIL—J. H. Brock, M. W. Dunscombe, T. Routledge, and E. Jakeways.

HON. TREASURER—G. L. Wood.

HON. SECRETARIES—T. Taylor Genge, 21, White Ladies' Road, Clifton; and G. F. Wetherman, 203, Gloucester Road, Bishopston.

Bristol and West of England Amateur Photographic Association.

Dates from about 1865, with headquarters at the Literary and Philosophic Club, 28, Berkeley Square, Bristol. Its members meet on the second Friday in the month, from September to April, and monthly excursions are made in the summer. Intermediate meetings, with professional and other demonstrations for the instruction of members, are held as frequently as possible. An album or portfolio of members' work is always in circulation. The association provides a dark room for the nse of members.

PRESIDENT—H. A Hood Daniel, F.S.I.

VICE-PRESIDENTS—Col. F. L. Playfair and Edward Brightman.

COUNCIL—President and Vice-presidents, T. Davey, W. Norgrove, J. Phillips, and H. A. Hutchinson.

HON. SECRETARY AND TREASURER—Fredk. Bligh Bond, 36, Corn Street, Bristol.

British Association for the Advancement of Science.

Dates from 1831, its headquarters are at Burlington House, London, W., and its annual meeting will be held this year from Aug. 3rd to 10th, at Edinburgh.

PRESIDENT—Dr. Huggins, F.R S.

PRESIDENT-ELECT—Sir Archibald Geikie, F.R.S.

HON. TREASURER—Prof. A. W. Rücker, F.R.S.

GENERAL SECRETARIES—Sir Donglas Galton, K.C.B.; A. Vernon Harcourt, F.R.S.

ASSISTANT GENERAL SECRETARY—G. Griffith, M.A.

Brixton and Clapham Camera Club.

Formed March, 1889, its headquarters are at the Clarence Rooms, 376, Coldharbour Lane, Brixton, S.W., and days of meeting first and third Tnesday in the month.

PRESIDENT—J. Reynolds, M.D., F.R.G.S.

VICE-PRESIDENT—W. H. Harrison.

COUNCIL—T. J. Bartrap, W. Bevins, J. A. Butler, J. H. Edwards, A. Haward, F. W. Kent.

ASSISTANT SECRETARY—R. Kidson.

HON. SECRETARY AND TREASURER—Fred W. Levett, 74, Geneva Road, Brixton, S.W.

Burnley Photographic Society.

Dates from 1885, its headquarters are at Bank Chambers, Hargreaves Street, Burnley, and ordinary meetings are held on last Wednesday in each month. Informal meetings are also held every Wednesday. The society is possessed of a good dark room and enlarging lantern.

PRESIDENT—John Butterworth, J.P.

VICE-PRESIDENTS—D. Drew, J.P., J. C. Brumwell, M.D., J.P.

COUNCIL—J. Altham, J. J. Bell, J. W. Collinge, V. Dunkerley, J. Holgate, A. Howarth, Rev. T. Leyland.

HON. TREASURER—J. L. Lee.

HON. SECRETARY—W. Sutcliffe, 7, Bank Hall Terrace, Burnley.

Burton-on-Trent Institute Amateur Photographic Association.

HEADQUARTERS—Institute, Burton-on-Trent.

PRESIDENT—Rev. J. Bramwell.

HON. SECRETARY—Samuel Sims, Stapenhill, Burton-on-Trent.

Burton-on-Trent Natural History and Archæological Society—Photographic Section.

Formed February, 1889, has its headquarters at 46, High Street, Burton-on-Trent, and meetings on the last Wednesday in each month.

PRESIDENT—R. Churchill.

HON. SECRETARY AND TREASURER—John E. Nowers, 282, Blackpool Street, Burton-on-Trent.

Bury Photographic and Arts Club.

Formed in 1882, has its headquarters at 13, Agar Street, Bury, and meets on the third Wednesday in each month. The clubrooms are open daily, containing news room and dark room (where many can work at once). An annual exhibition is held in November, and the members number 90.

PRESIDENT—Robert Grundy, jun.

VICE-PRESIDENTS—W. Booth and C. H. Openshaw.

COUNCIL—S. Litton, W. Heywood, D. Entwistle, J. Shaw, and J. Ward.

HON. TREASURER—Z. R. Bertwistle.

HON. SECRETARY—Roger Wood, 11, Bolton Street, Bury.

Cambridge Camera Club.

Formed in 1890, its headquarters are at 7½, Jesus Lane, and its meetings monthly.

PRESIDENT—F. Morley.

VICE-PRESIDENTS—F. Sanderson.

COUNCIL—H Burgess, A. Hardy, F. Worman.

HON. SECRETARY AND TREASURER—Geo. H. Potts, 1, Shaftesbury Villas, Carlyle Road, Chesterton, Cambridge.

Cambridge University Photographic Society.

Dates from 1881, and has its headquarters at 2, St. Mary's Passage. Its meetings are irregular.

PRESIDENT—W. N. Shaw, M A. Emmanuel.

VICE-PRESIDENT—Rev. G. B Atkinson, M.A. Trin. Hall.

COUNCIL—M. Horne, Trin , T. C. Fisher, Trin., H. G. Barry, Trin.

HON. SECRETARY AND TREASURER—W Jackson, Pembroke College, Cambridge.

The Camera Club.

The Camera Club is a social, scientific, and artistic centre for amateur photographers and others interested in art or science.

The club, which is situated in newly and specially-erected premises in the Charing Cross Road, London, is open on week-days from 10 a.m. to midnight, and on Sundays from 10 a.m. to 11 p.m. It combines the ordinary advantages of a club with the appliances and conveniences of a photographic and scientific society.

The club premises include the following conveniences and advantages :— A studio and an enlarging-room, each with its own dark-room attached ; nine separate dark rooms available to members at all times ; a laboratory for daylight operations ; a workshop with fitted lathe and other scientific appliances ; a billiard room, library, dining-room and large meeting-room.

An annual conference is organised under the auspices of the club, and up to the present has been held at the Society of Arts.

During the winter season, from October to May, meetings are held on Mondays and Thursdays for the reading of papers, for demonstrations, or lantern slide exhibitions, and for the same season there is a concert on the first Monday in each month. Photographic exhibitions are held in the room from time to time, the members' annual show being arranged so as to commence at the date of the annual conference.

A club journal is published and sent free monthly to members.

PRESIDENT—Capt. W. de W. Abney, C.B , R.E., D.C.L., F.R.S.

COMMITTEE—Sir George Prescott, Bart., Chairman ; F. Machell Smith, Vice-chairman ; Greenshill Allen, W. Brooks, William Clarke, F. Cobb, J. F. Collins, V. A. Carbould, A. Deed, H. M. Elder, M.A., E. Ferrero, Lieut.-Col. J. Gale, W. A. Greene, E. J. Humphery, M A., R. Inwards, A. Maskell, Duke of Newcastle, A. Pringle, J. F. Roberts, Bart. Rous, F. Seyton Scott, E. G. Spiers.

HON. SEC. TO COMPANY—W. A. Greene.

HON. MANAGING DIRECTOR—E. Ferrero.

HON. SECRETARY—George Davison, Camera Club, Charing Cross Road, W.C.

"Camera & Company."

Formed on May 1st, 1891, for the circulation and criticism of photographs entirely the work of members, and for a general interchange of ideas, with a view to the mutual advancement in the science and art of photography.

HON. SECRETARY AND TREASURER—Nichol Elliott, South Sea Cottage, Coldstream, N.B.

Cardiff Photographic Society.

Dates from 1886, its headquarters are at 31, Balcony, Queen Street Arcade, and it meets every Friday during the winter, at 8 p.m., whilst outings are arranged every Saturday during the summer.

PRESIDENT—Charles F. Gooch.

VICE-PRESIDENTS—Jonas Watson, J.P., Walter Insole, S. W. Allen, M.I.M.E., Alex. Scellar, T. Mansel Franklen, Eb. Lewis.

COUNCIL—W. H. Kitchen, Wm. Furley, Fred Heitzman, G. H. Hodges, Wm. Herbert, Alfred Freke, F. C. Webber, E. H. Bruton, A. McKinnon, C. H. Murrell, G. H. Wills, jun., D. B. McCallum, Wm. Booth, Fred Cadd, Thos. Forrest.

TREASURER—W. Foster.

HON. SECS.—G. H. Bedford and T. H. Faulks, 127, Bute Road.

Carlisle and County Amateur Photographic Society.

Formed February, 1885, with headquarters at the Viaduct Hotel, and meetings on the second Tuesday in each month.

PRESIDENT—The Mayor.

VICE-PRESIDENTS—C. S. Hall, M.R.C.S., and Dr. Thompson, L.A S.

COUNCIL—Messrs. Ritson, Robson, Macintosh, Moffet, Coward, and Gibson.

HON. TREASURER—John Forsyth.

HON. SECRETARY—John S. Atkinson, 55, South Pettril Street, Carlisle.

Cheltenham Amateur Photographic Society.

Dates from 1865, its headquarters are at the College Pharmacy, York House, Cheltenham, where it has a commodious suite of rooms, comprising clubroom, enlarging room, dark rooms and cloak room. The days of meetings are the first Tuesday in every month from October to May, and on every Tuesday evening between these dates.

PRESIDENT—E. Wethered, jun., F.R.G.S.

COUNCIL—E. Wethered, Philip Thomas, W. Beetham, W. H. Bagnall, J. Bull, G. A. Cardew, and L. Winterbotham.

HON. SECRETARY—Philip Thomas, York House, Cheltenham.

Chester Society of Natural Science and Literature (Photographic Section).

Dates from April 20th, 1887, its headquarters are at the Grosvenor Museum, Chester, and its meetings monthly, with an annual meeting on the last Friday in March.

CHAIRMAN OF SECTION—Dr. Stolterfoth, M.A., J.P.

COMMITTEE—A. G. Ayrton, E. G. Ballard, A.R S.M., E. W. Cowan, W. P. J. Fawcus, George Frater, J. M. Frost, F. Evans, and C. W. Townshend.

HON. SECRETARY AND TREASURER—J. H. Spencer, 36, Bridge Street, Chester.

Chiswick Camera Club.

Dates from December, 1891. Headquarters at 344, High Road, Chiswick, and meetings on Mondays.

CHAIRMAN—R. W. Watson.

COMMITTEE—G. Gentry, H. René Rainger, L. J. Hunt, A. E. Stedman.

HON. SECRETARY AND TREASURER—H. Harding Miller, Parkia, Chiswick.

City of Belfast Y.M.C.A. Camera Club.

Formed in 1888, has its headquarters at 14, Wellington Place, Belfast, and meets on the first Monday in each month, whilst fortnightly excursions are made on the first and third Saturday of each month from May until September.

PRESIDENT—Stanley B. Coates, M.D.

VICE-PRESIDENTS—Berkley D. Wise, C.E., William Swanston, F.G.S.

COUNCIL—Robert McCann, William Strain, John E. Pim, T. F. Bell, J. S. M. Best, Hamilton McCleery.

HON. TREASURER—James H. Hamilton.

HON. SECRETARIES—James McCleery and James H. Hamilton, 3, Eden Terrace, Woodvale Road, Belfast.

Cleveland Camera Club.

Formed 6th March, 1888, in Middlesbrough. It meets on the last Tuesday in each month at the "Cleveland Literary and Philosophical Society" rooms.

PRESIDENT—J. C. Dobbs.

VICE-PRESIDENTS—Dr. W. W. Stainthorpe and Geo. Bainbridge.

COUNCIL—J. E. Stead, Baker Hudson, J. A. Jones, and J. E. Ellam.

HON SECRETARY AND TREASURER—Joseph J. Hallam, 11, Amber Street, Saltburn-by-the-Sea, Yorkshire.

Clydesdale Camera Club.

Dates from January, 1889, and has its headquarters at Wemyss Bay, N.B. This club is principally a circulating one, as photographs are sent round every month by the members.

PRESIDENT—Henry Erskine Goreton.

HON. SECRETARY AND TREASURER—Miss Burns, Castle Wemyss, Wemyss Bay, N.B.

Colchester Camera and Sketching Club.

Formed February, 1890, its headquarters are at the Shaftesbury Hotel, and its days of meeting second Monday in month. It is open to professionals and amateurs.

PRESIDENT—Rev. C. L. Ackland, M.A.

VICE-PRESIDENTS—G. Joslin, F. T. Snell, W. Gill.

COUNCIL—C. E. Baskell, G. W. Baskell, C. E. Benham, E. Lingwood, F. Gröne, J. C. Shenstone, J. Millar Winch.

HON. TREASURER—F. T. Snell.

HON. SECRETARY—Harry Wright, 6, Head Street, Colchester.

Cornish Camera Club.

Dates its formation from 1888, has its headquarters at the Science Schools, Penzance, Cornwall, and holds meetings on the first and last Tuesday in each month. The club is possessed of a dark room, studio and enlarging room at the Science Schools, which are free to members. The hon. sec. will be pleased to give any information *re* the neighbourhood to visitors calling on him.

PRESIDENT—W. E. Baily, F.L.S.

VICE-PRESIDENT—B. Vivian, M.R.C.S.

COUNCIL—Barnes Richards, N. H. Symons, A.P.S., J. Branwell, jun.

HON. TREASURER—W. Herbert Percy.

HON. SECRETARY—H. Tonkin, 22, Market Place, Penzance.

Coventry and Midland Photographic Society.

Dates from 1883, and has its headquarters at the Coventry Technical Institute, Earl Street, where it now occupies a permanent room. It meets every alternate Wednesday.

PRESIDENT—Councillor Wm. Andrews.

VICE-PRESIDENTS—F. J. Harker, H. Sturmey, C. H. Waters, E. J. Walker.

COUNCIL—H. W. Jones, H. Hawley, C. Browett, and Rev. H. S. Mercer.

HON. TREASURER—W. L. J. Orton.

HON. SECRETARY—Thos. W. Orton, The Terrace, Earlsdon, Coventry.

Crewe Amateur Photographic Society.

Dates from January, 1889, its headquarters are at the Studio, Chester Bridge, Crewe, and meetings are held on Thursday evenings quarterly.

PRESIDENT—Rev. W. G. Rainsford, D.D.

VICE-PRESIDENTS—J. Knott, W. Eardley, E. Booth, W. Dishart.

COUNCIL—W. W. Gibson, R. H. Dutton, T. Popplewell, A. H. Badger, S. Hayward.

HON. TREASURER—John Cherrey.

HON. SECRETARY—Thomas Gorrell, 106, Edleston Road, Crewe, Cheshire.

Crewe Scientific Society—Photographic Section.

This section was formed in March, 1891, with headquarters at the Mechanics' Institution, and days of meeting on the first Wednesday in each month.

PRESIDENT OF SECTION—A. H. Hignett.

COUNCIL—W. Allwood, J. S. Hough, J. Lewis, H. J. Parkinson, F. S. Ransome, and F. C. Tipler.

HON. TREASURER—J. Kendrick.

HON. SECRETARIES—W. Bispham, 60, Samuel Street, Crewe, and Jos. Laing Victoria Street, Crewe.

Cromwell Photographic Club.

Formed in October, 1891, has its headquarters at the Cromwell Hotel, Hall Quay, Great Yarmouth, and meets on the second Monday in every month at 8 p.m. The proprietor of the Cromwell Hotel has provided dark rooms for the use of the club members and amateurs visiting the town.

PRESIDENT—R. H. Inglis-Palgrave, F.R.S.

VICE-PRESIDENTS—Miss V. Buxton, John Bately, M.D.

COMMITTEE—W. T. Grenfell, H. Pechey, G. Waller, jun., T. Goate, E. G. Leech, J. Williment, and P. Chamberlin.

HON. TREASURER—T. W. Swindell (Gurney and Co.'s Bank, Great Yarmouth).

HON. SECRETARY—Chas. Rumbold, jun., 4, Dene Side, Great Yarmouth.

Croydon Camera Club.

Formed in January, 1890, with headquarters at 56, George Street, Croydon, and days of meeting on Mondays and Fridays. The club is provided with a large meeting room, and also a dark room completely fitted, and containing an enlarging apparatus for day light or artificial light. The rooms are open at all times to members and visitors.

PRESIDENT—Hector Maclean, F.G.S.

VICE-PRESIDENT—B. Guy Wilkinson.

COUNCIL—A. W. Arthurton, E. F. Blow, S. E. Burrows, A. W. Hirst, H. E. Neeves, C. F. Oakley, E. P. Overton, J. Packham.

HON. TREASURER—A. J. Sargeant.

HON. SECRETARY—George R. White, 55, Albert Road, Croydon.

ASSIST. HON. SEC.—A. E. Isaac, Lower Addiscombe Road, Croydon.

Croydon Microscopical and Natural History Club—Photographic Section.

Formed in 1870, has its headquarters at the Public Hall, Croydon Literary and Scientific Institution, George Street, Croydon, and its meetings are held on Fridays. There is a dark room for use of members.

PRESIDENT—Edward Lovett.

VICE-PRESIDENT—Henry G. Thompson, M.D.

COUNCIL—John Weir Brown, J. A. Carter, B.A., W. Low-Sargeant, D. Waller, jun.

HON. TREASURER—E. B. Sturge.

HON. SECRETARY—Harry D. Gower, 16, Waudle Road, Croydon, Surrey.

Cyclists' Photographic Portfolio Club.

The club was formed in 1886 for the mutual criticism of members' prints, which are circulated from member to member in albums provided for the purpose, each member changing his prints on the album reaching him. There are at present 27 members, and there are four albūms in circulation. Applications for membership should be made to the secretary.

HON. SECRETARY—W. L. J. Orton, 7, Bishop Street, Coventry.

Darlington Photographic Society.

Dates from 1887, its headquarters are at the Imperial Hotel, Darlington, and its day of meeting the second Monday in each month. The society is undertaking a photographic survey of the Tees Valley for the present season.

PRESIDENT—J. Howlett.

VICE-PRESIDENT—H. W. Hollis.

COUNCIL—R. A. Luck, C. G. Davis, J. C. Valentine, P. J. Cooper, and E. Ensor, B.A.

HON. TREASURER AND SECRETARY—P. W. Forster, Elmbank, Darlington.

Derby Photographic Society.

Dates from 1884, with headquarters at Smith's Restaurant, Victoria Street, and meets on the second Tuesday in each month. The annual meeting is held on the second Tuesday in October.

PRESIDENT—Captain W. de W. Abney, R.E , C.B., &c.

VICE-PRESIDENT—Richard Keene.

COUNCIL—Messrs. Bourdin, Green, Scotton, Woods, Keene, jun., and Bennett.

HON. TREASURER—A. B. Hamilton.

HON. SECRETARY—Thomas A. Scotton, 9, Church Street, Derby.

Devon and Cornwall Camera Club.

Formed 13th October, 1888, its headquarters are at The Athenæum, Plymouth, and the members meet on alternate Mondays during the winter session. General meetings are held in the large hall of the Plymouth Athenæum, in George Street, near Millbay Station. In addition to a reading room the club has on the same premises a dark room and a well-lighted studio.

President—Robert Burnard.

Vice-presidents—W. Gage Tweedy, Major R. Barrington Baker, O.S D.

Council—Dr. Aldrige, J. S. Hawker, E. H. Micklewood, David Roy, A.R. Norrington, W. Square, Capt. Waye, R.N., Col. Stewart, R.E.

Hon. Treasurer—A. A. Carnell.

Hon. Secretary—R. Hansford Worth, C.E., 42, George Street, Plymouth.

Devon and Cornwall Camera Club (Postal Branch).

Formed October, 1879, for the circulation of an album every alternate month among the members after the photographs, which they have contributed as their own work, have been criticised by an independent authority, at present Mr. Valentine Blanchard being the critic.

President—Robert Burnard.

Council—The President, Hon. Treasurer, Hon. Secretary, Major Barrington Baker, J. Huddy, Dr. Aldridge, M.D., C. Norrington, David Roy, G. Soltare Symons.

Hon. Treasurer—A. A. Carnell.

Hon. Secretary—J. D. Pode, Slade, Ivy Bridge.

Devonport Camera Club.

Founded October, 1891, has its headquarters at the Temperance Hall, Fore Street, Devonport, and holds meetings on alternate Monday evenings.

President—J. B. Huddy (Chief Constructor H.M. Dockyard, Devonport).

Vice-presidents—E. Aslat, Dr. W. J. Gard.

Committee—E. J. Seymour, A. G. Hoyten, J. F. Coombes, C. H. Moore.

Auditor—W. T. Farrell.

Hon. Treasurer—J. Crook, 14, Portland Road, Devonport.

Hon. Secretary—Charles R. Rowe, 5, Keppel Place, Devonport.

Dewsbury Photographic Society.

Formed April 12th, 1888, its headquarters are at the Dewsbury and District Technical Schools, and it meets on the second Thursday in each month, the annual meeting being in January. Rambles and excursions are arranged during the summer months.

President—A. S. Marriott.

Vice-president—S. Mitchell, L.D.S.

Council—J. Taylor, L.D.S., Charles Naylor, and E. Scargill.

Hon. Secretary and Treasurer—George Kilburn, Rockley Street, Leeds Road, Dewsbury.

Doncaster Microscopical and General Scientific Society.

Dates from March 1880, has its headquarters at the Guildhall, Doncaster, and meetings on Wednesday evening for ordinary meetings. The society was first established in 1880 for the encouraging of microscopy, but its scope was afterwards extended so as to take in various branches of science.

PRESIDENT—T. Lovell Atkinson, M.A., L.L.B.

VICE-PRESIDENTS—Geo. Winter, J. Mitchell Wilson, M.D., F.C.S., W. E. Atkinson, J. G. Walker.

COUNCIL—J. M. Kirk, F.R.M.S., H. H. Corkett, M.R.C.S., Walter Roberts, The Rev. W. R. Weston, The Rev. Canon Tebbutt, J. Stratton.

HON. SECRETARY AND TREASURER—M. H. Stiles, 2, French Gate, Doncaster.

Dorset Amateur Photographic Association.

Formed in 1886, with headquarters at Dorchester, has no fixed days of meeting, but the Association circulates an album with members' prints quarterly, a prize being awarded by vote of members for the best print. It also circulates sundry photographic periodicals, and in the summer field meetings are held.

PRESIDENT—Rev. W. Miles Barnes, M.A.

COUNCIL—C. C. Hughes D'Aeth, Rev. E. J. Pope, M.A., W. J. Skeene.

HON. SECRETARY AND TREASURER—Rev. T. Perkins, M.A., F.R.A.S., Shaftesbury.

Douglas (I.O.M.) Photographic Society.

Formed in 1890. Headquarters, Britannia House, Loch Parade, Douglas. Its day of meeting is the last Tuesday in the month, and a Lantern Society also exists in connection with it, with which all the members of the Photographic Society are connected with the exception of the president, who is W. Thompson; it meets on the second Tuesday in the month.

PRESIDENT—J. M. Nicholson.

COUNCIL—Messrs. Thomson, Ralphe, Johnson, Lomas, and the officers.

HON. TREASURER—William Harrison.

HON. SECRETARY—Thomas McIsaac, Laron Villa, Shore Road, Douglas.

Dublin Y.M.C.A. Camera Club.

Dates from March, 1891, has its headquarters at 14, Lower Abbey Street, and holds meetings on the third Thursday in the month.

PRESIDENT—T. C. Tichborne, L.L.D.

COUNCIL—Messrs. Binks, Cochrane, Cameron, McKenzie, and Riky.

HON. SECRETARY—L. Davidson, 32, Manor Street, Dublin.

Dukinfield Photographic Society.

Established in 1888, it has a room on the ground floor of the Co-operative Hall, Astley Street, which is open every Wednesday evening from 7 till 10 for general conversation, reading, discussions, &c. Meetings are held on the fourth Tuesday in each month, and the annual meeting on the fourth Tuesday in April.

PRESIDENT—J. T. Lees.

VICE-PRESIDENTS—S. T. Ainsworth, Basil Hall, and W. H. Shirley.

COUNCIL—T. Borsey, C. H. Cooper, R. Deakin, J. W. Hadfield, James Leech, S. Woolley.

HON. TREASURER—J. Winterbottom.

HON. SECRETARY—Wm. Jenkinson, 17, King Street, Dukinfield.

Dundee Amateur Photographic Association.

Formed 1886, its headquarters are in Victoria Square, Nethergate, and its members meet on the third Tuesday of each month.

PRESIDENT—Wm. Young.

VICE-PRESIDENT—J. R. Stewart.

COUNCIL—G. McKenzie, D. Prophet.

HON. TREASURER—D. Ovens.

HON. SECRETARY—Jas. Rogers, 22, Barrack Street, Dundee.

Dundee and East of Scotland.

Dates from 1879, and has its headquarters in Dundee, at Lamb's Temperance Hotel, where its members meet on the first Thursday in the month from October to May. Two out-door meetings are held during the summer.

PRESIDENT—J. D. Cox.

VICE-PRESIDENTS—G. G. Maclaren and W. Salmond.

COUNCIL—J. W. Munro, A. Stewart, J. R. Stewart, J. R. Wilson, W. Bertie, W. F. Hill, Dr. J. K. Tulloch, H. Valentine, T. Berry, R. C. Henderson, P. Kerr, T. L. Wynd.

HON. SECRETARY AND TREASURER—V. C. Baird, Broughty Ferry, N.B.

Durham City Camera Club.

Formed February 19th, 1892, with headquarters at Shakespeare Hall, North Road, Durham, and meetings on the second Wednesday in each month, except June, July, and August, when excursions will be arranged. A dark room may be used at the shop of Mr. Wise, chemist, Claypath, by tourists and visitors until such time as the club is properly fitted.

PRESIDENT—Rev. H. E. Fox, M.A.

VICE-PRESIDENTS—Dr. Barron and Councillor E. White.

COUNCIL—Messrs. Bater, Morgan, Wise, and Whitfield.

HON. TREASURER—Councillor W. Gray.

HON. SECRETARY—Robert Hauxwell, The Avenue, Durham.

Ealing Photographic Society.

Dates from July 13th, 1890, and has its headquarters in the Public Buildings, where it meets on first and third Thursday in the month.

PRESIDENT—H. W. Peal.

VICE-PRESIDENTS—Dr. A. A. Common, F.R.S., C. Jones, C.E., W. T. White, F. H. Williams, A.R.I.B.A.

COUNCIL—A. Belt, Dr. Clifford Gibbons, C. Whiting, F. Wakefield.

HON. TREASURER—A. F. Taylor.

HON. SECRETARY—T. Simpson, Fennymere, Castlebar Hill, Ealing.

East London Photographic Society.

Founded April, 1891, has its headquarters at the Shoreditch Town Hall, Old Street, E.C., and meets on the second and fourth Tuesday in the month. An exhibition of members' work is held in October and prizes offered for competition.

PRESIDENT—Dr. F. J. Warwick.

VICE-PRESIDENTS—E. Stone, C. Tylee, F. Uffindell.

COUNCIL—W. J. F. Child, G. F. Eeles, Dr. Evans, S. Markheim, E. M. Minns, G. S. Pasco, R. Tylee, H. G. Wallis.

HON. SECRETARY AND TREASURER—M. A. Wilkinson, 21, Ferncliffe Road, Dalston, N.E.

Edinburgh Photographic Club.

Formed 1881, its headquarters are at 5, St. Andrew Street, Edinburgh, and its day of meeting the third Wednesday of each month. The membership is limited to 30, all of whom must also be members of the Edinburgh Photographic Society. All candidates for membership must submit examples of work. The board of management is as follows:—

PRESIDENT—John Stewart Smith.

HON. TREASURER—Thomas Wardale.

HON SECRETARY—G. G. Mitchell, 139, Dalkeith Road, Edinburgh.

Elizabethan Photographic Society.

Formed February 16th, 1887, is located at Queen Elizabeth's Grammar School, Barnet, and its members meet on Mondays for practical, and on the first Thursday in the month for lantern work.

PRESIDENT—Rev. J. Bond Lee, M.A.

VICE-PRESIDENTS—T. Samuels, H. W. Milne, and L. Matthews.

COUNCIL—W. Baddeley, H. Imray, L. Medland, and W. H. Ottaway.

HON. TREASURER—G. W. N. Harrison, M.A.

HON. SECRETARY—J. Brittain, jun., Eastcote Lodge, Richmond Road, New Barnet, Herts.

Exeter Amateur Photographic Society.

Dates from February, 1890, and has its headquarters at the City Chambers, Gandy Street, Exeter. Its days of meeting are the first Tuesday in the month, and in the six winter months on the third Tuesday as well. Morning excursions are made on the Wednesday after the monthly meeting, and afternoon ditto on the following Saturdays. Whole day excursions are held on Easter Monday, Whit-Monday, and the first Monday in August.

PRESIDENT—Dr. James Cheese.

VICE-PRESIDENT—W. Price Wall.

COUNCIL—Messrs. Berrie, Cole, Drake, Dudley, and Holden.

HON. TREASURER—J. Hinton Lake, High Street, Exeter.

HON. SECRETARY—Rev. John Sparshatt, Fairfield House, St. Thomas, Exeter.

Falkirk Amateur Photographic Association.

Dates from 1889. Its headquarters are in Newmarket Street, Falkirk, and its meetings are monthly. Exhibition of work and competition, confined to the members, will be held on the 2nd December, 1892.

PRESIDENT—Geo. Sherriff.

VICE-PRESIDENT—Jas. H. Aitkin.

COUNCIL—Messrs. Cowan, Higgins, Drummond, Johnston, Kirk, Beeby, and Capt. Jarrett.

HON. TREASURER—Jas. Cowan.

HON. SECRETARY—John Wall, Robert's Wynd, Falkirk.

ASSISTANT SECRETARY—John Higgins, Dundee Court, Falkirk.

Fairfield Camera Club.

Dates from 15th December, 1891, and its headquarters are at 36, Balmoral Road, Fairfield, Liverpool. It holds meetings on the second Tuesday in each month, and outdoor meetings are arranged during the summer months by the Excursion Committee, and lantern evenings during the winter. The club holds an annual competition for prints and lantern slides and has a small library.

PRESIDENT—J. L. Mackrell.

VICE-PRESIDENT—H. J. Mallabar.

COUNCIL—J. H. Welch, H. C. Hatton, J. Samuel, W. J. Sutherland, W. Pollard, H. Holt.

EXCURSION COMMITTEE—W. Pollard, J. H. Welch, T. E. C. Wilson, H. Holt, Hon. Sec.

HON. AUDITOR—T. E. C. Wilson.

HON. TREASURER—W. T. Sutton.

HON. SECRETARY—S. H. J. Smith, 17, Bentley Road, Liverpool.

Faversham Institute Photographic Society

Was formed April, 1890, with headquarters at the Faversham Institute, and meets on the third Tuesday in each month at 8.15 p.m. Excursions are made during the summer months for outdoor work and an annual exhibition is held.

PRESIDENT—The Right Hon. Viscount Throwley.

VICE-PRESIDENTS—Cap. Hooper, Dr. C. J. Evers, W. C. Stunt.

COMMITTEE—C. Cremer, F. Crosoer, A. N. Filmer, F. C. Jackman, M. Laxon, and C. H. Semark.

HON. SECRETARY AND TREASURER—Percy Dan, East Street, Faversham, Kent.

Fillebrook Athenæum - (Photographic Section)

Was formed 1890, with headquarters at the Fillebrook Lecture Hall, Leytonstone. Meetings are held irregularly.

PRESIDENT—G. Andrew Hutchison.

COUNCIL—Rev. J. Bradford, H. Kind, and Secretary.

HON. SECRETARY AND TREASURER—Joseph W. Spurgeon, Drayton Road, Leytonstone, Essex.

Finsbury Technical College Photographic Society

Was formed February, 1887, and has its headquarters at the Technical College, Leonard Street, City Road, London, where meetings are held every third Wednesday. Only past and present students of the college are eligible as members.

PRESIDENT—Prof. Meldola, F.R.S.

VICE-PRESIDENT — J. Castell Evans.

COUNCIL—M. B. Field, G. Hough, C. H. Desch, H. Staynes.

HON. TREASURER—T. H. Norris.

HON. SECRETARY—E. E. Gardner, Technical College, Leonard Street, City Road, E.C.

Friends' Photographic Society.

Formed in June, 1888, at Stoke Newington, it meets on the first and third Wednesday in each month at the houses of members, and excursions are made in the summer. A *soirée* is held each winter.

HON. SECRETARY AND TREASURER—Wm. Beck, jun., 3, Glebe Place, Stoke Newington, London, N.

Frome and District Photographic Club.

Dates from June, 1891, and has its headquarters at the Temperance Hall, Frome. Its meetings are held on the last Thursday in the month,

and outdoor excursions, &c., in summer months. It holds competitions, and has a circulating album, a dark room for use of members (and visitors on payment of a small fee), as well as an enlarging apparatus, for the use of which a fee is charged.

PRESIDENT—The Rev. H. B. Hare, M.A.

VICE-PRESIDENT—W. A. Turrell.

COUNCIL—H. G. Chislett, P. Edinger, A. Greenwell, and F. Penny.

HON. SECRETARY AND TREASURER—Dr. A. W. Dalby, Redland House, Frome, Somerset.

Glasgow Photographic Association

Was founded in 1862, and has its headquarters in the Philosophical Society's Rooms, 207, Bath Street. Its day of meeting is the first Thursday in the month from November to May.

PRESIDENT—Wm. Lang, jun., F.C.S.

VICE-PRESIDENTS—J. Craig Annan and Arch. Watson.

COUNCIL—A. Mactear, W. J. McIlwrick, G. Mason, J. Annan, J. Gardner, Wm. Brown.

HON. TREASURER—George Bell.

HON. SECRETARY—Fred. Mackenzie, 122, Wellington Street, Glasgow.

Glasgow and West of Scotland Amateur Photographic Association.

Formed in Jan., 1883, it has its headquarters at 180, West Regent Street, Glasgow, and carries out meetings on the third Monday of each month from October to April with conversation meetings every Monday. A dark room is at the disposal of members of other societies, the keys of which can be obtained from the dealers in Glasgow or the secretaries, and visitors are welcome to the meetings on the Monday evenings.

PRESIDENT—Thos. Taylor.

VICE-PRESIDENT—Wm. Miller.

COUNCIL—R. H. Elder, Archd. Watson, Hugh Reid, John Morison, jun., W. J. B. Halley, V. L. Alexander.

HON. TREASURER—J. Robertson Miller.

HON. SECRETARIES—Wm. Goodwin, 3, Lynedoch Street, Glasgow, and J. C. Oliver, 2, Royal Terrace, Glasgow.

Glenalmond Photographic Club.

Dates from June, 1890, and has its headquarters at Trinity College, Glenalmond, Perthshire, and its meetings on alternate Saturdays during the school terms. It is a public school club, consisting of boys and masters in the school. Competitions are held frequently The club has a dark room and use of a laboratory.

PRESIDENT—Arthur S. Reid, M.A., F.G.S.

VICE-PRESIDENTS—Rev. J. H. Skrine (Warden of Glenalmond) and Gordon Caldwell.

COMMITTEE—The officers of the club.

HON. TREASURER—U. G. Harrison.

HON. SECRETARY—E. H. Cunningham Craig, Trinity College, Glenalmond, Perthshire.

KEEPER OF BOOKS—J. V. Kitto.

KEEPER OF ALBUMS—H. de Putson.

Glossop Dale Photographic Society.

Formed October 22nd, 1883, and has its headquarters in Norfolk Square, Glossop. Business meetings are held on Tuesdays, and social meetings on Thursdays and Saturdays.

PRESIDENT—Captain Partington, J.P.

VICE-PRESIDENTS—Colonel Sidebottom, James Sidebottom, C.C., S. H. Wood, Rev. C. B. Ward.

COUNCIL—J. Merry, S. Bamforth, J. Walkden, T. Sharpe, H. Broadhurst, Rev. J. Lambley.

HON. TREASURER—J. Hardman.

HON. SECRETARY—J. Walton, 5, Hollin Cross Lane, Glossop.

Gloucestershire Photographic Society

Was reconstructed in 1887, and now has its headquarters in Bank Buildings, Southgate Street, Gloucester, and meets on the fourth Monday in the month. It has reading and dark rooms, and holds its annual meeting in April.

PRESIDENT—Rev. Mowbray Trotter.

VICE-PRESIDENT—F. H. Burr.

COMMITTEE—W. C. Beetham, A. H. Pitcher, T. G. Smith, H. S. Crump, W. J. Jenkins.

TREASURER—Dr. Hodges.

HON. SECRETARY—W. Walwin, Bank Buildings, Southgate Street, Gloucester.

Graphic Society.

Dates from 14th May, 1885, and has its headquarters at Plymouth. It has no stated days of meeting, its objects being to bring together artists in oil, water-colours, etc., amateur photographers, and others interested in art, through excursions and meetings. The annual meeting is held in January, and the ordinary meetings on alternate Mondays, but are variable.

President—S. Kerswill.

Council—Three officers, and Mrs. Allen, Mr. Foster, Mr. Micklewood, and Miss Steele.

Hon. Treasurer—G. F. Watson.

Hon. Secretary—J. S. Hawker, Mutley House, Plymouth.

Great Yarmouth Camera Club.

Formed in 1890, its headquarters are at The Tower, Gorleston, Yarmouth. It has no fixed date for meetings. They are called by special notice. The club is open to all ladies and gentlemen, professionals and amateurs, and is intended as a social club to help in the interchange of information and instruction in matters of art and photography.

President—F. Danby Palmer, D.L.

Council—Col. Shuttleworth, R.A., H. Dudley Arnott, and A. Price.

Hon. Treasurer—John Taylor.

Hon. Secretary—H. Harvey George, The Tower, Gorleston, Great Yarmouth.

Greenock Camera Club

Was formed in 1888. Its headquarters are at Greenock Museum. Meetings are held on the third Thursday of each month from September to April inclusive, and excursions are arranged during the summer months.

President—T. L. Patterson, F.I.C , F.C.S.

Vice-president—Jas. Graham.

Council—Hugh W. Walker, John Maclean, and James Wright.

Hon. Treasurer—Duncan Nicol.

Hon. Secretary—Wm. Blair, 40, Brisbane Street, Greenock.

Guildford Photographic Society.

Dates its formation from 10th December, 1890, and has its headquarters in Chapel Street, Guildford Street. Meetings are held on the second Tuesday in each month, and the society has a dark room open to members of any other photographic society. It holds excursions every alternate Wednesday, beginning with the last Wednesday in May and continuing till the end of September.

President—G. J. Jacobs, F.R.A.S.

Vice-president—J. Russell.

Council—E. Haslip, A. E. Moon, A. J. Moon, and J. Marshall.

Hon. Treasurer—J. H. Nunn.

Hon. Secretaries—A. W. Bullen and J. H. Nunn, 115, High Street, Guildford.

Hackney Photographic Society.

Formed in May, 1888, its headquarters are at the Morley Hall, Triangle, Hackney, and it holds meetings on the second and fourth Thursday in the

month. The annual meeting takes place in May. Ladies and professionals are admitted as members. The society owns a good lantern, and has a large library and a membership of over 100. Outings are arranged in summer.

PRESIDENT—Dr. Roland Smith.

VICE-PRESIDENTS—Dr. Kibbler, Frank Jolly, J. A. Sinclair, and J. Hubert.

COUNCIL—W. L. Barker, A. Dean, F. Houghton, H. J. Beasley, C. F. Hodges, and W. Wesson.

HON. TREASURER—J. O. Grant.

HON. SECRETARY—W. Fenton Jones, F.S.Sc., 12, Northumberland Houses, King Edward Road, Hackney.

Halifax Camera Club

Was formed in 1891, with headquarters at 12, Crossley Street, Halifax, and holds meetings on the last Friday in each month.

PRESIDENT—E. I. Smith.

VICE-PRESIDENT—Thos. Illingworth.

COUNCIL—J. I. Learoyd, W. H. Ostlen, Walter Wainhouse, Ed. J. Walker, and Dr. Priestley Leech, M.B., B.S.

HON. TREASURER—J. I. Learoyd.

HON. SECRETARY—Thos. Kershaw, 15, Queen's Road, Halifax.

Haltwhistle and District Photographic Society.

Dates its formation from 15th November, 1889.

PRESIDENT—Edward Joicey, J.P.

VICE-PRESIDENT—Dr. W. R. Speirs.

HON. TREASURER AND SECRETARY—David Macadam, Carlisle City and District Bank, Ltd., Haltwhistle.

Hampstead Photographic Club.

Meetings are held on the second and fourth Monday in the month. The membership is limited to twenty, and meetings are held at members' residences.

HON. TREASURER—C. A. Watkins.

HON. SECRETARY—A. L. Stuart, Fairview, Arkwright Road, Hampstead.

Harlesden and Willesden Photographic Society.

Dates its formation from 1890, and has headquarters at Court House, Harlesden, N.W., and holds its meetings on the first Tuesday in each month.

PRESIDENT—John Naylor.

COUNCIL—Messrs. Clapton, Pay, Hocking, Leed, Winterbon.

HON. TREASURER—L. R. Price.

HON. SECRETARY—Isaac Cohen, 26, Wendover Road, Harlesden, N.W

Hastings and St. Leonard's Photographic Society

Was formed October 22nd, 1888. Its day of meeting is the third Thursday in the month in winter, and it carries out excursions in the summer.

PRESIDENT—Wilson Noble, M.P.

VICE-PRESIDENTS—Lord Brassey, K.C B., J. H. Blomfield, Rev. A. M. Macdona, J. H. Mayor, A. C. Routh, M.D., W. Shuter, W. Stubbs, M Sullivan, and Macer Wright.

COUNCIL—H. E. Habershon, Rev. A. M. Macdona, J. Smith, J. H. Mayor, M. Sullivan, and J. H. Godbold.

HON. TREASURER—Rev. A. B. Cotton.

HON. SECS.—A. Brooker, Memorial Buildings, Hastings, and J. H. Gibson.

Helios Postal Photographic Club

Was formed in 1887. A case circulates each month amongst the members for the insertion of photographs, which are criticised by the other members, a notebook accompanying the case for notes and queries.

HON. SEC. AND TREASURER—A. R. F. Evershed, The Croft, Braintree, Essex.

Herefordshire Photographic Society.

Dates from November, 1888, with headquarters at the Mansion House, Hereford, and winter meetings are held on first Tuesday in each month, and field days on the first Thursday in each month. During the summer months the society holds competitions between the members.

PRESIDENT—Alderman Blake.

VICE-PRESIDENTS—T. J. Lalwey, Alfred Watkins, Jno. Parker.

COUNCIL—E. G. Davies, E Pilley, R. Clarke, E. W. H. Chave, A. H. Smith, H. J. Wilson, B. C. Kinsey, A. C. Edwards, jun.

HON. TREASURER—W. E. Staines, High Town, Hereford.

HON. SECRETARIES—Jno. Parker and E. G Davies, Mansion House, Hereford.

Holborn Camera Club

Was formed April, 1889, with headquarters at 100, High Holborn, W.C. It meets on Fridays, and social events are a special feature, including an annual supper and dance. It also holds an annual exhibition.

PRESIDENT—A. Horsley Hinton.

VICE-PRESIDENTS—Fred Brocas, S. T. Chang, T. O. Dear, D. R. Lowe.

COMMITTEE—E. H. Bayston, A. T. Ebsworth, A. J. Golding, A. Hodges, F. Knights, J. Stevens, H. West.

HON. TREASURER—Albert Bell.

HON. SECRETARY—F. J. Cobb, 3, Albion Grove, Barnsbury, N.

ASSISTANT HON. SECRETARY—Herbert Thompson.

HON. LIBRARIAN—J. Brittain.

Holmfirth Amateur Photographic Society.

Dates from 1885, and has its headquarters at Holmfirth, and holds its meetings on the last Friday in each month.

PRESIDENT—Arthur Preston.

HON. SECRETARY—David Bilsen, Birchin House, Holmfirth.

Hove Camera Club.

Formed March 24th, 1892, its headquarters are at the Hove Town Hall, and meetings are held on the second Tuesday in each month.

PRESIDENT—G. B. Woodruff.

VICE-PRESIDENTS—A. Hollis, M.D., F.R.C.P., H. H. Taylor, F.R.C.S., R. Dawson, M.D., and C. Job.

COMMITTEE—Miss Fuller, G. Emery, W. A. Ford, W. Jago, W. A. Watts, M.A., Woodbury, and A. H. Webling.

HON. SECRETARY AND TREASURER—James Williamson, 141, Church Road, Hove.

Huddersfield Photographic Society.

Dates from 14th November, 1888, its headquarters are at the Y.M.C.A., King Street, Huddersfield, and it holds meetings on alternate Thursdays.

PRESIDENT—Surgeon-Major Foster.

VICE-PRESIDENTS—T. K. Mellor and Alfred Armitage.

COUNCIL—W. H. Charlesworth, A. Clarke, B. Crook, H. Haigh, T. H. Fitton, F. W. Mills, H. T. Young, H. Oldfield, and Rev. G. C. B. Madden.

HON. SECRETARY AND TREASURER—H. G. Brierley, Glen View, Gledholt, Huddersfield.

Hull Amateur Photographic Society.

Dates from 1884, has headquarters at its own club-rooms in 71, Prospect Street, Hull, and meets every Thursday during the winter session, whilst excursions are arranged during the summer months. The society is affiliated to the P.S.G.B.

PRESIDENT—E. H. Howlett, F.R.C.S.

VICE-PRESIDENT—C. D. Holmes.

COUNCIL—C. F. Amos, J. G. Boville, J. P. Chatham, E. E. Cohen, Rev. W. Hay Fea, A. N. Jameson, D. C. Joy, A. E. Pearson, J. Pybus, T. Rose, C. O. F. Saner, J. Stothard, J. Walker.

HON. TREASURER—D. W. Sissons.

HON. SECRETARIES—J. H. Allcott, 31, Coltman Street, Hull; A. H. White, 141, Westbourne Avenue, Hull.

LIBRARIAN—B. M. Stoakes.

Ilkeston and District Photographic Society.

Formed January 9th, 1891, its headquarters are in Bath Street, Ilkeston, and its meetings are held on alternate Thursdays.

PRESIDENT—Dr. Carroll, D.P.H. (Camb.)

HON. TREASURER—Mr. Geo. Woolliscroft.

HON. SECRETARY—Wm. Shakespeare, M.I.J., Bath Street, Ilkeston.

Ipswich Photographic Society.

Dates from March 6th, 1888, it holds meetings on the second Wednesday in the month from October to April, and on the second Saturday from May to September.

PRESIDENT—J. Dixon Piper.

VICE-PRESIDENTS—E. H. Myddelton-Gavey, M.R.C.S., Evan Edwards, and E. R. Pringle.

COUNCIL—B. Corder, J. C. Curtis, W. Greenwood, A. F. Penraven, W. Stoddon, J. C. Wiggin, and F. Woolnough.

HON. SECRETARY AND TREASURER—Leonard Hill, Ashdown, Foxhall Road, Ipswich.

Isle of Thanet Photographic Society

Was formed in November, 1888, and its headquarters are at the Ramsgate Church Club, Broad Street, and meetings are held on the first and third Wednesday in each month. The society numbers 38 members, and possesses a small library and an enlarging lantern. Lantern slide and bromide enlargement competitions are held annually.

PRESIDENT—Rev. Harry Bartram, M.A.

VICE-PRESIDENTS—R. Hicks, M.R.C.S., W. Sanders, D.D.S., and the Rev. C. E. Eastgate, M.A.

COUNCIL—Messrs. Deacon, Holloway, Roe, Vigar, Wastall and Wellden.

HON. SECRETARIES AND TREASURERS—E. Baily, 9, Queen Street, Ramsgate, and G. F. Blower, Memel Villa, Ramsgate.

Jersey Amateur Photographic Society.

Formed in 1890, its headquarters are at 21, Grove Place, Jersey, and it meets on the first Wednesday in the month.

PRESIDENT—Capt. Thos. Lamb.

VICE-PRESIDENT—Lt.-Col. Jackson.

COUNCIL—Haddon Smith, J. Andrews, A. Messervy, J.P.

HON. TREASURER—G. L. M. Gruchy.

HON. SECRETARY—F. Woodland Tours, F.I.S., F.C.S., 21, Grove Place, Jersey, Channel Islands.

Keighley and District Photographic Association.

Dates from February, 1889, its headquarters are at the Mechanics' Institute, North Street, Keighley, and the members have exclusive use of dark and developing rooms, and a small lecture theatre for meetings, which are held on the first and third Tuesday of each month from October to March, and in the summer monthly.

PRESIDENT—J. W. Laycock.

VICE-PRESIDENTS—Samuel Bairstow and Thos. Heaps.

COUNCIL—E. Myers, W. H. Bailey, Alex Keighley, A. N. Kershaw, Rev. T. Mellodey, C. E. Smith, R. Smith, and J. Waters.

HON. TREASURER—Walter Mitchell.

HON. SECRETARY—John Gill, 27, Highfield Lane, Keighley.

Kendal Literary and Scientific Institution—Photographic Section.

Formed February, 1886, its headquarters are in the Museum Buildings, Kendal, and it meets on the second Wednesday in each month. The annual meeting is in September, and field meetings are held at convenient times during the summer months.

CHAIRMAN—Isaac Braithwaite.

COMMITTEE—F. Wilson, J.P., Samuel Rhodes (Chairman, Secretary, and Treasurer of Section, and Secretary of the Institution *ex-officio*).

HON. TREASURER—Frank P. Heath.

HON. SECRETARY—Charles E. Greenall, Thorny Hills, Kendal.

Kensington and Bayswater Photographic Society.

Formed March 21st, 1892, its headquarters are at Horbury Rooms, Kensington Park Road, W., and its days of meeting the second and fourth Friday in each month.

HON. TREASURER—F. A. Hahn, 3, Landsdowne Crescent, W.

HON. SECRETARY—Charles W. Brumwell, 7, Lower Terrace, Notting Hill, W.

Kilmarnock Amateur Photographic Society

Was formed in December, 1887, with headquarters at the Oddfellows' Buildings, and meetings on the third Wednesday of each month from October to April inclusive, and excursions for practice in the field when indoor meetings are ended. These are arranged as far as possible once each month, usually held on a Saturday.

PRESIDENT—Alex. Millar.

VICE-PRESIDENT—Thos. Ferguson.

COUNCIL—Alex. Millar, Thos. Ferguson, J. W. Wallace, Geo. Paxton, David Craig, David Boyd, and Jas. Thomson.

HON. TREASURER—John Wilson Wallace.

HON. SECRETARY—Jas. Thomson, 82, Hill Street, Kilmarnock.

King's Lynn Y.M.C.A. Photographic Club.

Formed June, 1891, with headquarters at the Y.M.C.A. Rooms, St. James's Street, and meetings on the second Tuesday in the month.

President—G. M. Bridges.

Vice-president—Rev. G. Wrigglesworth.

Council—W. H. Cockle, A. Taylor, H. Tilson, W. E. Daw, jun., A. Bridges, J. H. Hall.

Hon. Secretary and Treasurer—Mr. W. Winch, St. James's Street, King's Lynn.

Lancaster Photographic Society.

Formed in 1889, has headquarters at Springfield Barracks, and meets on the last Tuesday in each month.

President—H. L. Storey.

Vice-presidents—J. W. Pickard and H. J. J. Thompson.

Council—S. Fawcett, W. O. Roper, A. R. D. Macdonald, and R. W. Wearing.

Hon. Treasurer—A. B. S. Welch.

Hon. Secretary—W. Briggs, 21, Cheapside, Lancaster.

The Lantern Society.

Formed in March, 1890, has its headquarters at 20, Hanover Square, W., and holds its meetings on the second and fourth Monday in the month from October to April inclusive. The society possesses a loan collection of slides, and in addition members are enabled to borrow from the private stock of other members.

President—The Hon. Slingsby Bethell, C.B.

Chairman—E. M. Nelson, F.R.M.S.

Council—G. G. Baker Cresswell, A. R. Dresser, E. K. Hall, T. H. Holding, W. H. Maw, A. R. Sheppee, J. J. Vezey.

Hon. Secretary and Treasurer—Commander C. E. Gladstone, R.N., 6, Bolton Street, W.

Leamington Amateur Photographic Society.

Dates from June, 1887, its headquarters are the Trinity Church Room, Morton Street, and photographic lectures and demonstrations are given during the winter session, and excursions, &c., during the summer months.

President—Surgeon-General Ranking.

Hon. Treasurer—W. B. Magrath.

Hon. Secretaries—R. Aspa, Priory House, Leamington, and F. Gowan, 26, Clarendon Square, Leamington.

Leeds Photographic Society.

Dates from 1852, and has its headquarters at the Leeds Mechanics' Institution, where it holds meetings on the first Thursday and third Monday in each month. The society is affiliated to the P.S.G.B., and the first annual members' exhibition will be held in 1892.

PRESIDENT—E. H. Jacob, M.A., M.D.

VICE-PRESIDENTS—Godfrey Bingley and S. A. Warburton.

COUNCIL—Godfrey Bingley, W. A. M. Brown, Herbert Denison, E. H. Jacob, M.A., M.D , A. E. Nichols, Rev. E. S. Palmer, R. Steele, T. W. Thornton, J. H. Walker, S. A. Warburton.

HON. TREASURER—T. W. Thornton

HON. SECRETARIES—Herbert Denison and Robert Steele, 12, East Parade, Leeds.

Leeds Y.M.C.A.

Its headquarters are at the Y.M.C.A. Rooms, 13, South Parade, Leeds, and it meets every alternate Friday for practical work, and every Saturday afternoon in the season for photographic rambles. They have a dark room and photographic library.

PRESIDENT—H. Jackson.

VICE-PRESIDENT—Rev. J. A. Noble.

HON. TREASURER—J. Hazelip.

HON. SECRETARY—H. Eastwood, 82, Roundhay Road, Leeds.

Leicester Photographic Society.

Formed Oct. 14, 1885, has its headquarters at the Mayor's Parlour, Old Town Hall, and meets on the second Wednesday in each month.

PRESIDENT—Frank G. Pierpoint.

POST-PRESIDENTS—J. T. Cook and Geo. Bankart.

COUNCIL—Messrs. Bankart, Partridge, Joliffe, Squire, and Weatherhead.

HON. TREASURER—A. W. Wilson.

HON. SECRETARY—H. Pickering, High Cross Street, Leicester.

Leigh Photographic Society

Was formed in January, 1892, at the Old Grammar School, Leigh, and meetings are held every alternate Thursday.

PRESIDENT—J. H. Stephen.

VICE-PRESIDENTS—James Ward, B.A.

COUNCIL—W. Crouchley, T. Haddock, W. Hampson, Robert Leigh, Rev. H. Morrison, T. L. Syms.

HON. TREASURER—E. A. Williams.

HON. SECRETARY—W. Rose Moore, 56, Bradshawgate, Leigh.

Leith Amateur Photographic Association.

Formed in August, 1888, its headquarters are at 165, Constitution Street, and its day of meeting the last Tuesday of each month.

PRESIDENT—William Dougall.

VICE-PRESIDENT—William M. Smith.

COUNCIL—R. Hunter, T. W. Dewar, R. C. Ewart, A. D. Guthrie, J. Chapman, W. Campbell, W. Swanston, T. Wilson.

HON. TREASURER—John Pourie.

HON. SECRETARY—Alex. Pitkethly, 8, Wilkie Place, Leith.

Lewes Photographic Society.

Dates from 1888, its headquarters are at Fitzroy Library, High Street, Lewes, and it meets on the first Tuesday in each month at 8 p.m. Excursions are held during the summer months, and extra lantern meetings during the winter. The annual meeting is on the first Tuesday in September.

PRESIDENT—J. G. Braden.

VICE-PRESIDENT—J. Tunks.

COMMITTEE—H. Constable, W. B. Funnell, Percy Morris, G. J. Wightman, W. J. Young.

HON. TREASURER—E. J. Bedford.

HON. SECRETARIES—E. J. Bedford, 10, St. John's Terrace, Lewes, and Percy Morris, 203, High Street, Lewes.

Lewisham High Road Camera Club.

Formed April, 1890, its headquarters are in a class-room at the Congregational Church, Lewisham High Road, New Cross, S.E., and its days of meeting the first and third Friday in each month.

PRESIDENT—Rev. J. Morley Wright.

VICE-PRESIDENT—Alfred H. Miles.

COUNCIL—M. Stodart, R. W. James, M.I.C.E., E. Eastwood, Prof. Lambert, M.A., and C. Lanchester.

HON. SECRETARY AND TREASURER—B. Davidson, 62, Manor Road, Brockley, S.E.

HON. ASSISTANT SECRETARY—H. M. C. Sprunt, 192, New Cross Road, S.E.

Leytonstone Camera Club

Was formed in June, 1891, with headquarters at the Leytonstone Assembly Rooms, where it holds meetings on Wednesdays in winter, and on Saturdays in summer. "Field days" in Epping Forest and surrounding country.

PRESIDENT—Dr. W. Pickett Turner.

HON. TREASURER—Tom Symmons.

HON. SECRETARIES—Robert Overton, Leytonstone, and T. F. Sanderson, Brier Cottage, Leytonstone.



NORDFJORD, VED VASENDEN I LOEN.

Specimen Half-tone Photo Engraving by A. Wood & Son, St. Bernard's Row, Edinburgh.

Light and Company, Limited.

Dates from 1890, with headquarters at Halifax, is a postal portfolio club for the circulation and criticism of work done by the members.

Hon. Secretary—Wallace G. Thomson, Laurel Bank, Halifax.

Light and Truth Postal Photographic Club.

Formed in 1890 for the mutual instruction and recreation of the members, by the circulation per post of photographs produced by them for criticism, hints, exchange, &c., also for the discussion of photographic subjects, and occasional competitions.

Hon. Secretary—Henry E. Trew, A.P.S., 107, Old Town Street, Plymouth.

Lincoln Camera Club.

Formed March 12th, 1892, its headquarters will most probably be at the School of Science. It meets twice a month, but days are not fixed.

President—Rev. G. Stott, LL.D.

Vice-president—H. Mantle.

Council—Canon Fowler, T. Bell, W. J. Cant, R. Slingsby, G. Hadley, W. Asquith, T. Birkbeck, C. Smith, B. Tickers, and J. E. Dickenson.

Hon. Treasurer—J. M. Warnener.

Hon. Secretaries—W. R. Lilly, Riseholme Road, Lincoln; and J. W. Horton, Brayford Wharf, Lincoln.

Literary Photographic Club.

Formed in 1887, with headquarters at Walton Manor Lodge, Oxford, is a postal club, devoted as far as possible to prints having a literary history or connected with eminent persons, exchanges of prints being effected and discussion carried on by the members

Hon. Secretary and Treasurer—R. A. R. Bennett, B.A., Walton Manor Lodge, Oxford.

Liverpool Amateur Photographic Association.

Formed 1863, has its headquarters at 3, Lord Street, Liverpool, and meetings on the last Thursday in each month. The club room is at No. 3, Lord Street, where some of the members meet every day. There is an informal "coffee meeting" at four o'clock every Wednesday afternoon.

President—William Tomkinson.

Vice-presidents—Jos. Earp, and A. Tyrer.

Council—A. J. Cleaver, W. P. Christian, W. Hughes, H. J. Houghton, A. F. Stanistreet, H. Lupton, B. Boothroyd, G. A. Kenyon, H. B. Millar, F. Anyon, F. K. Glazebrook, Paul Lange.

Hon. Sec. of House Committee—T. S. Mayne.

Hon. Treasurer—P. H. Phillips.

Hon. Secretary—F. B. Illingworth, 2, Melville Place, Liverpool.

Librarian—J. Woolfall.

Liverpool Camera Club.

Dates from March 11th, 1891, and has rooms in 128a, Mount Pleasant, and holds meetings on the second and fourth Wednesday in each month, at 7.30 p.m. The annual meeting is in February, and field-days are held twice a month from April to September, and lantern evenings from October to March. Lady members are admitted.

PRESIDENT—Dr. Cecil F. Webb. B.A.

VICE-PRESIDENTS—James Hawkins and James Smith, jun.

COUNCIL—Wm. A. Stuart, Wm. A. Brown, Charles H. Freeman, Wm. Haywood, Alexander C. Yule, J. Herbert Jones, Rossel C. Robbins, Harry Handley, and Thos. Edwards.

HON. SECRETARY AND TREASURER—William Tansley, 14, Wentworth Street, Liverpool.

ASSISTANT SECRETARY—Arthur Dobson.

Liverpool Central Y.M.C.A. Camera Club.

Formed February, 1889, headquarters at the Y.M.C.A. Institute, Mount Pleasant, Liverpool, and meets every Wednesday. The club room is open from 7 to 8-30 p.m. for business and elementary instruction.

PRESIDENT—Wm. Prior Christian.

VICE-PRESIDENTS—T. Jameson and J. Fowler Shone.

HON. TREASURER AND SECRETARY—John C. Lee, 56, Garrick Street, Liverpool.

ASSISTANT SECRETARY—Herbert Hannah, 104, Moss Grove, Lodge Lane, Liverpool.

Liverpool Physical Society (Photographic Section)

Was formed in 1890, and has its headquarters at University College, Liverpool. It is specially devoted to the science of photography.

PRESIDENT—Dr. F. Hurter.

HON. SECRETARY—Dr. Charles A. Kolm, University College, Liverpool.

Llanelly Amateur Photographic Society.

Dates from May, 1891, its headquarters and dark room are in Frederick Street, and its meetings on the first Thursday in every month.

PRESIDENT—John H. Rogers, J.P.

VICE-PRESIDENT—Dr. Roderick.

COUNCIL—R. Hughes, W. Rees, D. J. Williams, J. P. Millar, G. Williams, E. Evans, Wm. Thomas, F. M. Bevan.

HON. TREASURER—Thomas Henry Rogers.

HON. SECRETARY—John Daniell, Dovedale House, Llanelly.

London and Provincial Photographic Association

Was formed in 1882, its headquarters are at the Champion Hotel, 15, Aldersgate Street, and it meets every Thursday evening at 8 p.m. A library is in course of formation, and monthly lantern meetings are held in the season, and monthly outings during the summer. Visitors from abroad or the provinces are always welcome. 149 members.

TRUSTEES—J. Traill Taylor, J. B. B. Wellington, and F. W. Pask.

CURATOR—A. Haddon (librarian).

COUNCIL—G. W. Atkins, W. D. Atkinson, J. Weir Brown, F. de P. Cembrano, C. H. Cooke, P. Everitt, T. E. Freshwater, J. S. Teape.

HON. SECRETARY AND TREASURER—R. P. Drage, 95, Blenheim Crescent, London, W.

London Social Camera Club.

Formed in 1886, with headquarters at 265, Strand, W., is a section of the London Social Cycling Club, and meets by arrangement.

HON. TREASURER—George Wheeler.

HON. SECRETARY—W. H. Cornell, 11, Mason's Avenue, E.C.

Loughboro' Literary and Scientific Society (Photographic Section).

Formed in January, 1888, has its headquarters at the Market Place, Loughboro', and its meetings on the second Wednesday in each month.

PRESIDENT—J. B. Colgrove, M.A.

VICE-PRESIDENT—W. C. Burder.

COUNCIL—J. W. Taylor, jun., C. H. Coltman, President, and Vice-president.

HON. TREASURER—W. T. Tucker.

HON. SECRETARIES—W. Clarke and W. T. Tucker, Herrick Road, Loughboro'.

Louth and District Photographic Society.

Formed February, 1890, its headquarters are at 8, Upgate, Louth, Lincolnshire, and ordinary meetings are held on the second Monday in the month. The society has always been open to professional and amateur workers. The present number of members is sixty-five. The society's dark room is at Mr. Mark Smith's, Mercer Row, Louth.

PRESIDENT—W. G. Smyth.

COUNCIL—Colonel Ranshaw, Rev. J. M. Coates, Captain Fowler, H. S. Forman, C. James, and Walter Shephard.

HON. SECRETARY AND TREASURER—S. Francis Clarke, L.D.S., 8, Upgate, Louth, Lincolnshire.

ASSISTANT HON. SECRETARY—Herbert C. Bentley.

Lowestoft and District Photographic Society

Was formed on May 5th, 1891, with headquarters at the School of Art, Regent Road, Lowestoft. Its meetings are on the first and third Friday in the month.

PRESIDENT—T. G. Maynew.

CHAIRMAN—W. Stringfield.

COMMITTEE—Rev. A. Wells, F. W. Emuss, J. Rose, A. M. Smith, F. N. Smith A. Young.

HON. TREASURER—W. J. Roberts.

HON. SECRETARY—Miss A. Lee Stringfield, St. Cyre's, London Road, Lowestoft, Suffolk.

Luton and District Photographic Society

Was founded February, 1890. Its headquarters are at the Cowper Arms Coffee Tavern, and it meets on alternate Mondays.

PRESIDENT—Cyril Flower, M.P.

VICE-PRESIDENTS—A. Carruthers, F. E. Percival, and W. Wardill.

COUNCIL—A. V. Spratley, T. Dawson, W. Morrison, J. Davis, W. Roberts, and G. W. Bindloss.

HON. TREASURER—W. Bontwood.

HON. SECRETARY—Geo. Bunyan, 19, Elizabeth Street, Luton, Beds.

Maidstone Amateur Photographic Society.

Dates from 1888, with headquarters at The Palace, and meetings every Friday at 8 p.m.

PRESIDENT—John E. Austin.

COUNCIL—P. Adams, H. Bear, W. Day, F. Laurence, Laurence Green, F.C.S., H. A. Potvine, H. W. Morfett, H. Sandland, J.P., C. E. Wright.

HON. TREASURER—R. P. Grant.

HON. SECRETARY—Lionel Stansell, F.C.S., 167, Boxley Road, Maidstone.

Manchester Amateur Photographic Society.

Formed 1885, headquarters the Manchester Athenæum, its day of meeting is the second Tuesday in each month, and it has dark rooms for enlarging, &c., free to members, at 14, Ridgefield, Manchester. Its total number of members is now 407.

PRESIDENT—J. W. Wade.

VICE-PRESIDENTS—J. Davenport, J. G. Jones, Rev. H. J. Palmer, M.A., and H. Smith.

COUNCIL—E. Ashman, J. Bathe, T. M. Brook, J. Drinkwater, T. Glazebrook, Dr. Hamilton, F. W. Parrott, T. Prince, W. Shirley, and H. Sykes.

LIBRARIAN—C. C. Bowker.

HON. TREASURER—C. Dawson.

HON. SECRETARY—Randolph Gilmore, solicitor, 1B, Cooper Street, Manchester.

Manchester Camera Club.

Formed in 1885, has its headquarters at the Victoria Hotel, Manchester, and meets on the third Wednesday in the month.

COUNCIL—J. Bathe, J. Drinkwater, J. T. Foster, W. Hebburn, and J. W. Wade.

HON. TREASURER—J. Davenport.

HON. SECRETARY—Chas. Dawson, 66, Peter Street, Manchester.

Manchester Photographic Society.

Dates from as far back as 1855, its headquarters are at 36, George Street, Manchester, and it meets on the second Thursday in each month. Out-door meetings are held during the summer.

PRESIDENT—Abel Heywood, jun.

VICE-PRESIDENTS—John Schofield, T. R. Cobley, H. M. Whitfield, A. Brothers, F.R.A.S., and S. Okell, F.R.A.S.

COUNCIL—D. E. Benson, F. W. Burt, T. Chilton, C. H. Coote, F. Edwards, J. T. Hughes, J. Macnamara, J. Wood, and H. Woolley.

HON. TREASURER—W. G. Coote.

HON. SECRETARY—W. H. Farrow, 36, George Street, Manchester.

LANTERN SECTION.

COMMITTEE—J. T. Hughes, M. W. Thompstone, H. M. Whitfield, and J. Wood. Meetings from October to March inclusive on the fourth Wednesday.

HON. CUSTODIAN OF APPARATUS—M. W. Thompstone.

LIBRARY in charge of Messrs. J. Schofield and C. H. Coote, Hon. Librarians.

Manchester Y.M.C.A. Photographic Club.

Dates from 30th April, 1890, its headquarters are at 56, Peter Street, Manchester, and its meetings are held on the first Thursday in each month.

PRESIDENT—J. A. Beith, J.P.

VICE-PRESIDENT—W. H. Newett.

COUNCIL—S. H. Tottle, A. W. Pearson, W. H. Machin, W. H. Cheetham, G. B. Swann.

HON. TREASURER—G. T. White.

HON. SECRETARY—John Irvine, 55, Peter Street, Manchester.

Margate Photo Society

Was formed March 21st, 1892, with headquarters at 24, Cecil Square, Margate, and monthly meetings on Thursdays. The principal object of this society is the production of lantern slides. A paper is read by each member and incidents of adventure illustrated.

PRESIDENT—Dr. Eliotte.

HON. SEC. AND TREASURER—A. King, B.A., L.D.S., R.C.S., 24, Cecil Square, Margate.

Midland Camera Club.

Formed October 16th, 1891, its headquarters are at Queen's College, Birmingham, and its days of meeting the first and third Friday in the month, with informal and smoking evenings every Monday. The club possesses a suite of three club rooms, secretarial office and library, general meeting room, and dark room.

PRESIDENT—Hall Edwards, L.R.C.P.

VICE-PRESIDENT—Rev. J. Henry, F.R.G.S.

COUNCIL—H. R. Leech, M.R.C.S., Dr. Radcliffe, Edward Morton, H. Roland White, W. J. Spurrier (assist. sec. and librarian).

HON. TREASURER—S. G. Mason.

HON. SECRETARY—Walter D. Welford 47, Hagley Road, Birmingham.

ASSIST. HON. SECRETARY—W. J. Spurrier, 3, Queenswood Road, Moseley.

Munster Camera Club

Was formed in 1891, and has its headquarters at the Crawford Municipal School of Science and Art, Nelson's Place, Cork. Its members meet on the second Wednesday of each month, and the club has an excellent dark room at the Municipal School, to which visitors (non-resident) are admitted free.

PRESIDENT—Major J. Douglas Lysaght, A.P.D.

VICE-PRESIDENT—Ringrose Atkins.

HON. TREASURER—W. R. Atkins, F.C.A., South Mall, Cork.

HON. SECRETARY—Denham Franklin, J.P., 74, South Mall, Cork.

Mutual Improvement Postal Photographic Society.

Formed April, 1892.

PRESIDENT—F. E. Goater.

HON. SECRETARY AND TREASURER—Albert B. Moss, 64, Wood Lane, Uxbridge Road, London, W.

National Association of Professional Photographers of Great Britain and Ireland.

Formed February 18th, 1891, its headquarters are at Birmingham, and it meets quarterly, or as arranged by council.

PRESIDENT—T. Hall, London.

VICE-PRESIDENTS—C. Lafosse, Ilfracombe; R. Slingsby, Lincoln; H. J. Whitlock, Birmingham.

COMMITTEE—W. Barry, Hull; T. Birtles, Warrington; M. J. Byrne, Richmond; T. Bromwich, Bridgnorth; W. Brookes, Manchester; J. Chancellor, Dublin; Wm. Cobb, Tottenham, London; J. S. Davis, Halifax; W. E. Debenham, London; J. E. Eddison, Barnsley; J. J. Elliott, London; J. Fergus, Largs (Scotland); Thos. Forrest,

Pontypridd, Wales; Guy, Cork; Wm. Gill, Colchester; R. B. Gregson, Blackburn; J. Lafayette, Dublin; Midwinter, Bristol; H. S. Mendelssohn, London; Jas. Martin; McIver, Leeds; John Moffatt, Edinburgh; C. Pettingall, Liverpool; F. M. Sutcliffe, Whitby; C. Vandyke, London; Van der Weyde, London; F. M. Whaley, Doncaster.

Hon. Treasurer—John Crosby, Rotherham.

Hon. Secretary—C. P. Richards, Barrow-in-Furness.

Secretary—D. J. O'Neill, 47, Charlotte Road, Birmingham.

Naturalists' Field Club (Photographic Section).

Formed October 3rd, 1890, with headquarters at Cambridge Hall, Barrow-in-Furness, and meetings fourth Thursday in the month.

President—A. Blechynden.

Vice-presidents—W. Dunlop and R. Spencer, F.C.S.

Hon. Secretary—John Redhead, 9, Spring Street, Barrow-in-Furness.

Newcastle-on-Tyne and Northern Counties Photographic Association.

Formed 1881, headquarters at the Central Exchange Art Gallery, Newcastle-on-Tyne. Meetings are held on the second and fourth Tuesday in each month, except May, June, July, August and September, during which months outdoor meetings are held.

President—A. S. Stevenson, J.P.

Vice-presidents—J. P. Gibson and H. G. Ridgway.

Council—M. Auty, J. Brown, W. P. Brewis, W. E. Cowan, T. O. Mawson, W. Parry, J. H. Robinson, G. L. Snowball, J. Watson, L. Williamson.

Hon. Treasurer—J. W. Robson.

Hon. Secretary—Edgar G. Lee, 11, Beverley Terrace, Cullercoats, near Newcastle-on-Tyne.

Newport Camera Club.

Dates from March 28th, 1891, and has its headquarters at the Newport Albert Hall, meeting on the fourth Monday in each month.

President—Edmund H. Watts, jun., F.R.G.S.

Vice-presidents—Archdeacon Bruce, M.A., F.R.A.S., and Alderman Geo. H. Llewellyn.

Council—P. A. F. Villiers, W. J. Charles, W. H. Manhire, L. Lockyear, E. Clyde Lewis, Vivian Fudge, John Thomas, and T. A. Grove.

Hon. Treasurer—E. J. Smith.

Hon. Secretaries—F. Parsons, F.S.Sc., and H. E. Lewis.

All communications to 60, High Street, Newport, Mon.

Curator—Mr. J. Watkins, North Street, Newport, Mon.

Newport Sketching and Photographic Society.

Formed May, 1888, has its headquarters in the Town Hall, Newport, Mon., and carries out Thursday and Saturday excursions. General members' meeting for criticism of work first Monday in month.

PRESIDENT—Alfred Swash, M.S.A.

VICE-PRESIDENT—J. S. Kerslake.

COUNCIL—C. J. Hutchins, A. H. Townsend, F. J. Heybyrne, T. Davis, T. H. Frederick, R. Richards, H. P. Phillips, W. Craddock, H. Crease, J. W. Lloyd.

HON. TREASURER—Ernest Banks.

HON. SECRETARY—John J. Swalwell, The Lea, Gold Tops, Newport, Mon.

Norfolk and Norwich Camera Club.

Dates from 4th October, 1886, it holds meetings on the second Monday in the month.

PRESIDENT—Dr. Bensley, LL.D.

VICE-PRESIDENTS—H. Harvey George and J. Algar.

COMMITTEE—Messrs. Lathom, Day, Fison, and Dr. Thomson.

HON. SECRETARY AND TREASURER—Colonel H. Wood, C.B., 95, Thorpe Road, Norwich.

Northamptonshire Natural History Society and Field Club (Photographic Section).

Formed April 21st, 1876, has no regular quarters, but meetings are held at the Museum and Grammar School. It is worked by the section president and secretary, under the direction of the committee of the society.

PRESIDENT OF SECTION—H. Manfield.

HON. SECRETARY OF SECTION—Joseph J. Wetherell, Billing Road, Northampton.

North Kent Amateur Photographic Society

Was formed in 1887, and has its headquarters at Gravesend, and meets on the second Thursday in each month at 8 p.m.

PRESIDENT—I. C. Johnson, J.P.

VICE-PRESIDENT—E. J. Wall.

COUNCIL—J. K. Barlow, P. J. Boorman, J. Caddil, jun., J. Stewart Dismoor, E. W. Field, F. Hamerton, S. Hodsoll, A.C.A., S. R. Macartney, J. H. Morris, T. Nettleingham, T. Pilkington, C. A. Rotherham, H. Sandford.

DELEGATES TO P.O.S. OF G.B.—I. C. Johnson and S. Hodsoll.

HON. SECRETARY AND TREASURER—G. W. Cobham, P.A.S.I., 3, Edwin Street, Gravesend, Kent.

North London Photographic Society

Was formed in 1857. Its headquarters are at the Wellington Hall, Islington, N., and it meets on the first and third Tuesday in each month.

PRESIDENT—J. Traill Taylor.

COUNCIL—G. J. Clarke, J. Douglas, W. Few, C. M. Griffiths, B. J. Grover, Rev. E. Healy, A. Mackie, J. Oakley, E. W. Parfitt, R. Tanner.

CURATOR—W. T. Coventon.

HON. SECRETARY AND TREASURER—Wm. Bishop, 69, Oakfield Road, Stroud Green.

North Middlesex Photographic Society.

Formed in June, 1888, has its headquarters at Jubilee House, Hornsey Road, and meets on the second and fourth Monday in each month at 8 p.m. Field days are organised for Saturday afternoons and holidays during the season.

PRESIDENT—J. W. Marchant.

VICE-PRESIDENTS—H. Walker, F. L. Pither.

COUNCIL—C. Beadle, F. Cherry, C. C. Gill, C. O. Gregory, T. C. Lathbridge, J. C. S. Mummery, J. Saville, H. Smith, J. Stewart, W. Taylor, J. L. Treadway, S. E. Wall.

HON. TREASURER—F. W. Cox.

HON. SECRETARY—J. McIntosh, 14, Lowman Road, Holloway.

ASSISTANT HON. SEC.—F. M. Ainsley, 6, Dagmar Road, Stroud Green.

North Surrey Photographic Society.

Dates from January 5th, 1887, its headquarters are at 369, Norwood Road, S.E., and its members meet on first and third Tuesdays of the month.

PRESIDENT—J. Morrish.

VICE-PRESIDENT—L. Wolff.

COUNCIL—T. J. Bright, F. Chambers, J. Dalzell, J. Larcombe, W. Rouch, H. Senier.

HON. SECRETARY AND TREASURER—R. W. Wilson, 42, Norwood Road, Herne Hill, S.E.

North Wales Amateur Photographic Society.

Dates its formation from February 18th, 1892, and has its headquarters at the News Room and Library, 44, Mostyn Street, Llandudno, where its members meet on the first and third Thursday in the month. The general room and dark rooms of the society are open daily, and may be used by visitors for a small fee. Certain hours are reserved for ladies only.

PRESIDENT—W. Bevan.

HON. TREASURER—Elias Jones, J.P., C.C.

HON. SECRETARY—Rev. George E. Catlin, Christ Church, Llandudno.

Notts Amateur Photographic Association

Was founded in 1884. Its headquarters are at 32, Market Street, Nottingham, and its days of meeting Mondays at 8.

PRESIDENT—H. Blandy.

VICE-PRESIDENTS—C. B. Wright and Professor Heaton.

HON. TREASURER—S. Wells.

HON. SECRETARY—J. Duncan Pearson, Chilwell House, Notts.

Oldham Photographic Society

Was established 1867. Meetings are held at the Lyceum, Union Street, on the last Thursday in each month at a quarter to eight p.m. The annual meeting is held on the last Thursday in October. Most of the photographic journals are placed on the table for the members' perusal. Members enjoy the privilege of using the library, apparatus, &c., and also of becoming subscribers to the various photographic journals at special reduced terms. Presentation prints are given annually, in September, to each member.

PRESIDENT—W. Thompson.

VICE-PRESIDENT—J. Chadwick.

TREASURER—W. Schofield.

COUNCIL—J. H. Ashton, J. Brooks, J. S. Dronsfield, J. Greaves, jun., T. Heywood, W. Jackson.

LIBRARIAN—L. Tetlow.

HONORARY SECRETARY—T. Widdop, 16, Burnaby Street, Oldham.

ASSISTANT SECRETARY—W. A. Nash.

Oxford Photographic Society.

Formed October, 1889, with headquarters at 136, High Street, and meets on the first and third Tuesday in each month.

PRESIDENT—E. A. Ryman Hall.

VICE-PRESIDENTS—C. C. Cole, A. F. Kerry, M.A., A. F. Stanley-Kent, M.A., and J. H. Salter.

COUNCIL—Rev. W. H. Price, M.A., N. G. French, H. M. Phillips, W. J. King, G. W. Norton, A. Robinson, and G. Smith.

HON. TREASURER—J. Minn.

HON. SECRETARIES—F. A. Bellamy, F.R.Met.Sc., 4, St. John's Road; and H. Minn, 104, Walton Road.

Oxford University Photographic Club.

Formed in 1880, has headquarters at 24, Friars' Entry, and meets three times in each term.

PRESIDENT—A. J. Clay, New College.

COMMITTEE—O. V. Darbishire, Balliol College, J. L. Myers, New College, F. W. Bown, University College.

HON. TREASURER—J. Walker, M.A., Christ Church.

HON. SECRETARY—A. Eglington, Lincoln College, Oxford.

Oxfordshire Natural History Society.

Founded for the encouragement of the study of natural history and kindred sciences, and, among others, of photography. Meetings are held on alternate Thursdays during term in the University Museum.

PRESIDENT OF THE SOCIETY—Professor A. H. Green, M.A., F.R.S.

PRESIDENT OF THE PHOTOGRAPHIC SECTION—E. A. Ryman Hall.

GENERAL SECRETARY—Mrs. Peters, 12, St. Margaret's Road, Oxford.

Our Camera Club.

Formed in July, 1891, meets at the Assembly Rooms, Leytonstone, on Wednesday evenings, with "field days" in summer.

PRESIDENT—Dr. W. Pickett Turner.

HON. TREASURER—Tom Symmons.

HON. SECRETARIES—Robert Overton, Leytonstone, and T. F. Sanderson, Brier Cottage, Leytonstone.

Paisley Photographic Society.

Formed 1857, and reorganised in 1885, the rooms of the society are at 9, Gauze Street, where there is a commodious dark room, accessible at all times to members. Meetings are held monthly, from October to April. A number of lantern meetings are also held during the season. Conversation meetings are held weekly, and excursions to places of interest in the neighbourhood are arranged during the summer months.

HON. PRESIDENTS—H. H. Smiley and Stewart Clark.

HON. VICE-PRESIDENTS—Robert Harris, James Donald, jun., James Barr, and Matthew Morrison.

PRESIDENT—A. F. McCullam.

COUNCIL—Robert Ferrier, Alexander Kilpatrick, Edward Cook, Morris M. Wright, and Thomas H. Taylor.

TREASURER—Richard N. W. Thomson.

SECRETARY—David B. Jack, Glencairn, Blackhall, near Paisley. Lantern Section—R. M. Easton, Thos. H. Taylor, and Thomas Rastall (secretary), 4, Douglas Terrace.

People's Palace Photographic Club.

Formed in May, 1888, has its headquarters at the People's Palace, Mile End Road, E., and meets on the first and third Friday evenings in the month at 8 o'clock.

PRESIDENT—Sir Edmund Hay Currie.

VICE-PRESIDENTS—E. Howard Farmer and T. W. Gamble.

COMMITTEE—C. W. Hastings, R. Beckett, S. J. Beckett, and Messrs. Edwards, Patten, Walker, Kendal, Bolton, Lawday, and Hawkins.

HON. SECRETARY AND TREASURER—William Barrett, 16, Clare Road, Forest Gate, E.

Perthshire Society of Natural Science (Photographic Section).

Formed in 1889, with headquarters at Perth.

PRESIDENT—A. Thomson, M.A., D Sc., F.C.S.

COUNCIL—A. Hodge, R. C. Ferguson, J. Stewart, and D. Ferrier, F.C.S.

HON. SECRETARY—William Ellison, 2, Dalhousie Street, Perth.

Peterborough Photographic Society.

Dates its formation from May 20th, 1887, its headquarters are at the Museum, Minster Precincts, and its members meet on the first Monday in the month.

PRESIDENT—Geo. Kirkwood, M.D.

VICE-PRESIDENTS—T. J. Walker, M.D., J.P., J. M. Kennedy, M.D., J. H. Hetley, G. W. Leigh, E. Worthington, H. M. Townsend.

COMMITTEE—W. H. Marsh, J. F. Perkins, W. H. Pentney, A. C. Taylor, B. R. Ward.

HON. TREASURER—W. Atkinson.

HON. SECRETARY—A. W. Nicholls, 11, Cromwell Road, Peterborough.

Photographers' Benevolent Association

Was founded in 1873, and now has its headquarters at 55, Chancery Lane, London, W.C. It meets when urgent or necessary, its objects being to receive subscriptions and donations, and by other means to raise funds, and to apply them to the following purposes:—(1) The assistance by grants or loans to persons connected with photography, their widows and orphans who are in necessitous circumstances arising from age, sickness, misfortune or any other cause. (2) The grant of annuities for life, or for a term of years, to such persons as are qualified to receive such annuities. And (3) to aid unemployed photographers in obtaining situations.

PRESIDENT—J. Traill Taylor.

TRUSTEES—Capt. W. de W. Abney, C.B., F.R.S., and W. S. Bird.

COMMITTEE—Messrs. Atkinson, Berry, Bedford, Drage, Freshwater, Harris, Hepworth, Hindley, Hume, Mackie, Parfitt, Rolph, Snowden, Ward and Tabrum.

HON. TREASURER—John Spiller, F.I.C., F.C.S.

HON. SECRETARIES—H. J. Beasley and W. J. Tabrum, 55, Chancery Lane, London, W.C.

The Photographic Club.

Dates from 1879, with headquarters at Anderton's Hotel, Fleet Street, London, E.C. Its members meet every Wednesday evening at 8, and outings are arranged on Saturdays and Bank Holidays during the summer. Lantern

meetings on the last Wednesday in each month from October to March inclusive, and a ladies' night on the last Wednesday in January. Occasionally smoking concerts are also held, and the annual meeting on the first Wednesday in November. The club possesses a photographic library of nearly 400 volumes.

TRUSTEES—William Bedford, Frank Haes.

COMMITTEE—F. P. Cembrano, jun., Edgar Clifton, R. P. Drage, E. W. Foxlee, J. Guardia, H. M. Hastings, J. Nesbit, J. B. B. Wellington.

LIBRARIAN—E. A. Newell.

CURATOR—Mr. H. R. Hume.

RECORDER—Mr. Thomas Bedding.

HON. SECRETARY AND TREASURER—F. A. Bridge, East Lodge, Dalston Lane, London, N.E.

Photographic Convention of the United Kingdom.

Formed in 1886, with headquarters in London. The Photographic Convention of the United Kingdom was established on principles similar to those of the British Association. The first meeting was held at Derby in 1886, and the increased numbers attending the yearly gatherings, held subsequently at Glasgow, Birmingham, London, Chester, and Bath—opened in each provincial case by the mayor of the town—make it clear that the objects of the Association need only be made known to be fully appreciated, not only by those specially interested in photography, but by scientific men generally. The great interest displayed at each meeting in the papers and discussions, together with the exhibition of pictures and apparatus, have incontestably proved the usefulness of the organisation. It meets yearly for one week, and the convention of 1892 will be held in Edinburgh in July.

PRESIDENT—William Bedford.

PRESIDENT-ELECT FOR 1892-93—George Davison.

COUNCIL—W. A. Ashman, T. Berry, C. H. Bothamley, F. A. Bridge, J. J. Briginshaw, A. Carnell, A. Cowan, G. Davison, H. A. H. Daniel, R. P. Drage, F. Evans, A. Haddon, M. J. Harding, H. M. Hastings, H. L. Henderson, R. Reeve, A. J. King, P. Lange, W. Lang, jun., A. Levy, C. P. Lucas, E. Marlow, G. Mason, A. Mackie, T. Mayne, W. W. Naunton, J. Provitt, A. Pringle, B. J. Sayce, A. Seaman, J. M. Smith, H. Sturmey, J. Stuart, J. Traill Taylor, A. Tate, J. M. Turnbull, W. H. Walker, G. W. Webster, J. B. B. Wellington, A. Werner.

HON. SECRETARY AND TREASURER—F. P. Cembrano, jun., 10, Cambridge Gardens, Richmond.

Photographic Society of Great Britain.

Usually known as the Parent Society, was formed on January 20th, 1853. It has headquarters at 50, Great Russell Street, W.C., and its meetings are on the second Tuesday in the month from November to June. It holds an annual exhibition of photographs and of objects connected with photography; it also issues a journal, in which the proceedings of the society are published. Its library and dark room are open daily from 2 to 9.30 p.m.

President—Captain W. de W. Abney, C.B., R.E., D.C.L., F.R.S., F.C.S.

Vice-presidents—Jas. Glaisher, F.R.S., F.R.A.S., T. Sebastian Davis, John Spiller, and Sir H. Trueman Wood, M.A.

Council—W. Ackland, G. L. Addenbrooke, W. Bedford, Alex. Cowan, Thos. R. Dallmeyer, W. E. Debenham, W. England, J. Gale, F. Hollyer, F. Ince, G. L. Johnson, J. W. Swan, J. Traill Taylor, Leon Warnerke, W. S. Bird, A. Mackie, Captain A. M. Mantell, A. Pringle, and Professor J. M. Thompson.

Hon. Treasurer—G. Scarnell.

Hon. Secretary—H. Chapman Jones, Royal College of Science, London, S.W.

Photographic Society of Ireland.

Established in 1854, and re-established in 1879, has its headquarters at 15, Dawson Street, Dublin, where it has a reading-room, dark-room, &c. Besides the regular meetings (second Friday and fourth Thursday, September to May inclusive), smoking meetings and excursions are frequently held.

President—G. Mansfield, J.P.

Past President—Sir Howard Grubb, F.R.S.

Vice-presidents—J. A. Scott, M.B., F.R.C.S.I., H. Bewley.

Council—J. Carson, R. M. Inglis, M. Hedley, F.R.C.Y.S., J. A. C. Ruthven, E. McD. Cosgrave, M.D., J. White, A. Werner, J. H. Woodworth, R. L. Strangways, M.A., and A. M. Geddis.

Hon. Treasurer—W. Bewley.

Hon. Secretary—J. H. Hargrave, B.A., A.M.I.C.E., 3, Newtownsmith, Kingstown, Dublin.

Polytechnic Photographic Society.

Formed October, 1891, with headquarters at the Polytechnic, 309, Regent Street, W. It meets on the first and third Friday in the month. Membership is limited to *bonâ fide* photographic members of the Photographic Institute, and past or present members of the Polytechnic School of Photography (both amateur and professional).

President—Quintin Hogg.

Vice-presidents—W. E. Debenham and Robt. Mitchell.

Council—W. E. Brown, J. Crossley, G. J. Goose, F. J. Lock and J. G. Mothiron.

Hon. Treasurer—Fred. W. Jackson.

Hon. Secretary—Fred R. Tissington, 102, Shaftesbury Road, Crouch Hill, N.

Postal Photographic Club.

Formed in 1886, has its headquarters at Walton Manor Lodge, Oxford, and circulates prints for criticism and exchange among the members once a month, and discussions are carried on in a note-book which accompanies the prints.

Hon. Secretary and Treasurer—R. A. R. Bennett, B.A., Walton Manor Lodge, Oxford.

Postal Photographic Society.

Formed May 1st, 1891, for the circulation of prints and negatives amongst members for criticism, etc. The club has 19 members (including four ladies) scattered all over the United Kingdom, and two boxes are always circulating amongst them.

HON. SECRETARY AND TREASURER—Geo. D. Nickels, 1, South Down Cottages, Upton Road, Torquay.

Preston Camera Club

Was formed July, 1891, and has its headquarters at Hill Place, Fishergate, where it has a good club room, dark room, and lecture room; also enlarging apparatus, optical lantern, burnisher, etc., for the use of members. Its days of meeting are Thursdays.

PRESIDENT—J. S. Oliver.

VICE-PRESIDENT—J. Simpson.

COUNCIL—H. Jackson, B. Simpson, A. E. R. Lewty, Jas. Macintosh, W. F. Livesey, and W. Newton.

HON. TREASURER—Oswald Simpson.

HON. SECRETARY—W. J. T. Jackson, 55, Fishergate, Preston.

Pudsey District Photographic Society.

Dates from February, 1891, with headquarters at the Mechanics' Institute, Pudsey, and meetings every alternate Tuesday from October to April, and first Tuesday in each month from April to October. It is open to both amateur and professional photographers.

PRESIDENT—Dr. W. L. Hunter.

VICE-PRESIDENTS—J. Barrow and H. Crossley.

COUNCIL—H. Clapham, W. S. Crowther, T. Marshall, H. E. Vickers, W. Goodall.

HON. TREASURER—J. Goodman.

HON. SECRETARY—W. H. Hinings, Manor House Street, Pudsey, Yorkshire.

Putney Photographic Society.

Dates its formation from 13th December, 1890, its headquarters are at 90, High Street, and its meetings are held from October to April on the second Wednesday and last Saturday in each month, and from May to September on the first Wednesday in each month. Ladies and gentlemen are equally eligible, and excursions are arranged during summer months.

PRESIDENT—The Hon. Baron Pollock.

VICE-PRESIDENTS—Rev. L. Macdona, Dr. W. J. Sheppard.

COUNCIL—Dr. J. F. Farrar, H. Faulkner, T. Gilbert, and Chas. Ballard.

HON. TREASURER—Wm. Martin, jun., 4, Lower Parkfield.

JOINT HON. SECRETARIES—L. S. Zachariasen, Alfred Villa, Putney Bridge Road, and W. F. Gorin, 3, Montserrat Road.

Richmond Camera Club.

Formed July, 1880, its headquarters are at the Greyhound Hotel, Richmond, Surrey, and it meets every Friday at 8 p.m. Field days are held on alternate Saturday afternoons during the summer months, and lantern evenings on the first Friday of the month.

PRESIDENT—F. P. Cembrano, jun.

COMMITTEE—G. Ardaseer (Hon. Librarian), C. H. Davis, Arthur Hunter, R. L. Kidd, E. G. Richardson, and G. W. Ramsay.

HON. SECRETARY AND TREASURER—P. Ennis, 28, Halford Road, Richmond.

Rochdale and District Photographic Society.

Dates from 1890, its days of meeting are the second Tuesday and fourth Monday in each month.

PRESIDENT—John Albert Bright, M.P.

COUNCIL—R. M. Jones, C. R. Beaumont, J. H. Crabtree, T. P. Spedding, C. Blomley, and V. O'Neill.

HON. TREASURER—J. H. Hoyle.

HON. SECRETARIES—William Ingham and Samuel Ingham, 30, Freehold Street, Rochdale.

Rochester Naturalists' Club—Photographic Section.

Founded November 28th, 1891, at the Mathematical School, Rochester, meetings every alternate Saturday.

COUNCIL—C. Bird, F.G.S., J. S. Hewitt, J. H. Whitfield, and J. C. Boone.

HON. SECRETARY—E. Siddons Wilson, 1, Hillside Villas, Weston Road, Strood, Rochester.

Rotherham Photographic Society.

Formed October, 1889, its headquarters are at 5, Frederick Street, Rotherham, and its members meet on the first Tuesday in each month. Excursions to places photographically interesting are held periodically, and an exhibition of members' and other work early in the year.

PRESIDENT—Dr. F. B. J. Baldwin.

VICE-PRESIDENTS—E. Isle Hubbard, W. H. Haywood, G. T. M Raekstraw.

COUNCIL—I. Wright, W. H. Shephard, W. Mason, J. W. Whittington, T. W. Mosby, and the officers.

HON. TREASURER—James Leadbeater.

HON. SECRETARY—H. C. Hemmingway, 6, Stanley Street, Rotherham.

Royal College of Science Photographic Society.

Founded February, 1888, at the Royal College of Science, it meets on Tuesdays (fortnightly). The club consists of some 40 members.

PRESIDENT—Capt. Abney, F.R.S.

VICE-PRESIDENTS—Dr. H. H. Hoffert, Chapman Jones.

COUNCIL—L. M. Jones, G. J. Snelus, C. Makin, E. F. Ellis, R. C. Griffith.

HON. SECRETARY—J. E. Snelus, Royal College of Science, South Kensington, London.

Royal Naval Engineering College Photographic Club.

Formed April, 1891, has its headquarters at the R.N.E. College, Devonport, and meets on alternate Wednesdays.

PRESIDENT—W. S. Hill, R.N.

COUNCIL—R. G. L. Markham, R.N., W. R. Skelton, R.N., H. Wall, R.N., and W. B. Hall, R.N.

HON. SECRETARY AND TREASURER—J. S. Constable, R.N., R.N.E. College, Devonport.

Selby Camera Club.

Formed in 1891, its headquarters are in Park Street, and its meetings on Thursdays at 8 p.m. during winter months. It has a dark room for changing or developing plates, available for tourists and visitors.

PRESIDENT—The Rev. A. G. Tweedie, M.A.

VICE-PRESIDENTS—Wm. Rawling and J. C. Thompson.

COUNCIL—J. H. Bantoft, T. R. Cooper, E. Swain, and W. A. Watson.

HON. LIBRARIAN—W. J. Allison.

HON. SECRETARY AND TREASURER—W. N. Cheesman, The Crescent, Selby.

Shaw Church Institute, Photographic and Art Society.

Formed on September 11th, 1888, has its headquarters at the Shaw Church Institute. Its days of meeting are first Friday in the month.

PRESIDENT—E. Brooks.

VICE-PRESIDENT—Rev. E. E. Goodacre, B.A.

COUNCIL—J. H. Ashton, J. Waddington, J. Broadbelt.

HON. SECRETARY AND TREASURER—John Maiden, 91, Rochdale Road, Shaw.

Sheffield Camera Club.

Formed in 1888, is confined to amateurs, and lady members are admitted. Its headquarters are at the Pharmaceutical Society's Rooms, New Surrey Street, and it meets on the fourth Wednesday in each month.

PRESIDENT—G. E. Maleham.

VICE-PRESIDENTS—T. H. Moton, M.D., and J. H. Rawson.

COUNCIL—Prof. J. O. Arnold, G. T. W. Newsholme, A. Capley, Geo. Ellinor, W. H. Strangways, Dr. E. Skinner.

HON. TREASURER—B. W. Winder, F.R.M.S.

HON. SECRETARY—Wm. Gilley, jun., 11, Kenwood Park Road, Sheffield.

Sheffield Optical Lantern Society.

Dates from February, 1890, its headquarters are at St. Paul's Schools, Cambridge Street, Sheffield, and its meetings are on the third Thursday in each month. The annual meeting is on the third Thursday in February.

PRESIDENT—E. J. Draper.

VICE-PRESIDENTS—J. T. Frith and J. Clowes.

COUNCIL—H. Staniforth, J. Maclowrin, T. J. Allen, W. Platts, T. Baker, J. W. Whittington, J. Simpson, J. Temperton.

HON. TREASURER—A. Copley.

HON. SECRETARY—J. S. Stephens, 6, Sheaf Gardens Terrace, Sheffield.

Sheffield Photographic Society.

Formed in 1876, has its headquarters at the Masonic Hall, Surrey Street, and holds its meetings on the first Tuesday in the month at 7.30, and its annual meeting and exhibition in October, open to both amateur and professional photographers.

PRESIDENT—B. J. Taylor.

VICE-PRESIDENTS—Geo. Bromley, Thos. Firth.

COUNCIL—Messrs. Smith, Sampson, Davy, Furness, Hibbert.

REPORTER—E. H. Pearce.

HON. TREASURER—Bradley Nowill.

HON. SECRETARY—Ernest Beck, Fairmont, Shoreham Street, Sheffield.

Shropshire Camera Club.

Formed in June, 1886, has headquarters at 9, The Square, Shrewsbury, and meets on the second Wednesday in the month.

PRESIDENT—M. I. Harding.

VICE-PRESIDENTS—J. R. Greatorex, W. S. Buddicom, G. Bidlake.

COUNCIL—W. Alltree, W. Heath. W. Burson, R. I. Irwin, Dr. E. Cureton, F. W. Williams, W. Bowdler, J. L. Della Porta.

HON. TREASURER—M. I. Harding.

HON. SECRETARY—Walter W. Naunton, 9, The Square, Shrewsbury.

Simpson Memorial Photographic Society

Was formed in March, 1891, with headquarters at Simpson Memorial School, Moston, Manchester, and meetings on the first Tuesday in the month. Ladies are admitted. A fine lantern is placed at the disposal of the society by the governors of the institution; as is also the lecture-room for the society's meetings, and a dark room for demonstrations, etc

PRESIDENT—Jas. Wood.

VICE-PRESIDENT—T. R. Cobley.

COUNCIL—J. Edwards, W. H. Lyas, J. B. Stockwell, Saml. Coulthurst, J. Price.

HON. TREASURER—J. G. Sankey.

HON. SECRETARY—J. A. Dearden, 2, Ashley Mount, Ashley Lane, Harpurhey, near Manchester.

South Hornsey Photographic Society.

Dates from September, 1891, and meets every third week.

CHAIRMAN—P. A. Legge.

VICE-CHAIRMAN—D. B. Harrower.

COUNCIL—M. H. Hudson, S. Lang, C. May, and C. E. Roberts.

HON. SEC. AND TREASURER—Harold A. Rutt, 2, Alexandra Road, Finsbury Park, London, N.

South London Photographic Society.

Dates its formation from 5th April, 1889, its headquarters are at the Hanover Hall, Hanover Park, Peckham, and its days of meeting first and third Monday in the month. A 12×10 camera with two lenses and three double backs, and an optical lantern have been purchased and are loaned to members.

PRESIDENT—F. W. Edwards.

VICE-PRESIDENTS—H. G. Banks, Maurice Howell, Dr. T. G. Munyard and W. Rice.

COUNCIL—Messrs. Boxall, Eldridge, Fellows, Fitness, Groves, Herbert, Lyon, Miller and Webb.

HON. TREASURER—E. A. Whitby.

CURATOR—W. Moss.

HON. SECRETARY—C. H. Oakden, 51, Melbourne Grove, East Dulwich, S.E.

EXCURSION SECRETARY—W. F. Slater, 169, Southampton Street, Camberwell, S.E.

South Manchester Photographic and Lantern Society.

Formed February, 1892, with headquarters at the Longford Lecture Hall, and meeting on the last Monday in the month.

CHAIRMAN—W. I. Chadwick.

VICE-CHAIRMAN—W. Linnell.

HON. TREASURER—E. M. Bowden.

HON. SECRETARY—M. W. Thompstone, Beaufort House, Brooklands, near Manchester.

Southport Social Photographic Club.

Dates its formation from October 28th, 1890, its headquarters are at The Studio, Cambridge Arcade, Southport, and it meets every Wednesday evening at 8.15. The club is strictly a "social" one. The first Wednesday evening in each month is a committee meeting at 7.30. The remainder of the evening is spent as a social evening. On the other evenings in the month are given practical demonstrations and lantern exhibitions at Mr. Cross's studio. A library has lately been instituted in connection with the club, and already a good number of volumes have been presented to the club.

PRESIDENT—Robt. J. Parkes.

VICE-PRESIDENTS—A. Dunmore and A. Quayle.

COUNCIL—Miss Dunmore, C. F. De Pree, G. Cross, J. C. Smith, and W. P. Brown.

LIBRARIAN—Geo. Cross.

HON. SEC. AND TREASURER—J. R. Cave, 52, Nevill Street, Southport.

Southsea Amateur Photographic Society.

Dates from 1888, and has headquarters at 3, King's Road, Southsea. Its meetings are held on the first and third Wednesday in each month, and the business of the society on the first Wednesday, and exhibitions, readings and discussions on the second Wednesday. Excursions are held during the season. A dark room and enlarging apparatus are available for visitors to Southsea on introduction and payment of small subscription. The society is affiliated to the Photo Society of Great Britain.

PRESIDENT—Commander Cobb, R.N.

VICE-PRESIDENT—J. J. Thornton.

COUNCIL—Dr. Ford, Messrs. Grant, Fisher, A. H. Wood, and Sawyer.

HON. TREASURER—J. J. Thornton.

HON. SECRETARY—Major H. W. B. Bruno, Ordnance Lodge, H.M. Gun Wharf, Portsmouth.

Spen Valley Photographic Society.

Dates its formation from 1890, and has its headquarters at the Cleckheaton Coffee Tavern, where it holds meetings on the second Tuesday in each month. A chemistry class is taught by the president, and a dark room with daylight and limelight enlarging lantern is open for the use of the members.

PRESIDENT—Dr. Farrow.

VICE-PRESIDENTS—Wm. Bell, B. H. Goldthorpe, Dr. J. A. Sutherland, and Dr. J. Sykes.

COUNCIL—W. Armitage, J. Burnhill, A. Cooper, J. H. Jackson, A. H. Knowles, J. C. Phelon, G. Potts, R. Smith, and W. H. Wright.

HON. TREASURER—E. Smith.

HON. SECRETARY—J. H. Jackson, The Studio, Cleckheaton.

Staffordshire Potteries Amateur Photographic Society.

Formed April, 1890, its headquarters are at the Town Hall, Burslem, and it meets on the first Tuesday in the month at 8 p.m. The headquarters are at Burslem, but the society is open to the whole of the Potteries.

PRESIDENT—Edward B. Wain.

VICE-PRESIDENTS—R. S. Burgess (*ex-officio*), T. Blackshaw, F. Bettany, and W. Burgess (U S. Consul).

COUNCIL—J. W. Myatt, J. Porter, A. J. Stonier, W. B. Triner, W. Slater, and W. H. Walley.

HON. TREASURER—S. Crosse.

HON. SECRETARIES—J. F. Hewitt, 35, Market Place, and F. C. Powell, Swan Square, Burslem.

St. Bartholomew's Hospital Photographic Society.

Formed in March, 1890, at St. Bartholomew's Hospital, Smithfield, London.

PRESIDENT—Dr. W. J. Russell, F.R.S.

VICE-PRESIDENTS—Dr. V. D. Harris and Dr. Lewis Jones.

COMMITTEE—James Berry, Esq., F.R C.S., J. A. Crump and W. Eccles.

HON. TREASURER—Dr. Andrew.

HON. SECRETARY—W. J. Armitage, St. Bartholomew's Hospital, London, E.C.

The Stereoscopic Club.

Dates from January, 1891, its headquarters are at Brooklands Hotel, Manchester, where meetings are held on the first Monday in the month.

PRESIDENT—James Whitelegg.

HON. TREASURER—J. E. Vos.

HON. SECRETARY—W. I. Chadwick, Brooklands, near Manchester.

Stockport Photographic Society.

Dates its formation from May 29th, 1889, and has its headquarters at the Mechanics' Institution, meeting on the second Wednesday in each month, also fourth during November, December, January and February. The annual meeting and election of officers is in May.

PRESIDENT—Thos. Kay.

VICE-PRESIDENTS—W. B. Leigh and Colonel H. Turner, J.P.

COUNCIL—A. M. Gourley, H. N. Cooper, G. Hidderley, F. Brooke, H. J. Heginbotham, G. H. Broome, Oliver Coppock, H. D. F. Dobson, and S. Kay.

HON. TREASURER—Thos. Bedford.

HON. SECRETARY—B. S. Harlow, Buckan House, Heaton Norris, Stockport.

Stockton Photographic Society.

Formed 1887, with headquarters at Mason's Court, High Street, Stockton, its meetings are on the second Tuesday in each month at 8 p.m. Members enjoy the free use of a dark room, completely fitted up, and an enlarging lantern, for the use of which a small fee is charged.

PRESIDENT—H. McDonnell.

VICE-PRESIDENTS—J. H. Jackson and W. Downs.

COUNCIL—H. Bradley, A. H. Byers, W. S. Fothergill, W. Hodgson, W. Moult, W. W. Stainthorpe, M.D.

TREASURER—J. H. Rhodes.

HON. SECRETARY—J. E. Ellam, Yarm-on-Tees.

Sun & Co. Postal Photographic Club.

Formed April, 1887, is limited to forty amateur photographers Established for the circulation and criticism of photographs, entirely the work of members, and for a general interchange of ideas. A portfolio is issued monthly.

HON. SECRETARY—Martin J. Harding, Lexden Gardens, Shrewsbury.

Sunderland Photographic Association.

Dates its formation from October 16th, 1888, it meets the first week in each month (except May, June, July, August, and September, when outdoor meetings are held). During the winter monthly competitions amongst members are held for various classes of work done during the preceding summer. There are over 60 members.

PRESIDENT—W. Pinkney.

VICE-PRESIDENT.—A. Stafford.

COUNCIL—W. Bartram, J. W. Broderick, J. Lynn, W. Milburn, W. J. Pope, W. Pratt, A. Peddie, R. Stafford.

HON. TREASURER—T. Walton.

HON. SECRETARY—Chas. E. Cowper, Thornhill Gardens, Sunderland.

Sutton Scientific Society Photographic Club.

Dates from January 11th, 1886, its headquarters are those of the Scientific Society, Mulgrave Road, Sutton, Surrey, and it meets on the first Tuesday in the month.

PRESIDENT—E. de Clifford.

HON. SEC. AND TREASURER—Miss Emily Culverhouse, The Hundred Acres, Sutton, Surrey.

Swansea Amateur Photographic Association.

Formed in 1888, its headquarters are at the Tenby Hotel, Walter Road, and its members meet on the last Friday in each month.

PRESIDENT—B. H. Morgan.

VICE-PRESIDENTS—W. E. Brown, C. W. Slater.

HON. TREASURER—Hy. Hoskins.

HON. SECRETARY—E. Ernest Morgan, Bryn Naut, Swansea.

Sydenham Camera Club.

Formed 1890. Headquarters, Greyhound Hotel, meeting on alternate Tuesdays. Outing every third Saturday from the end of May to the end of August.

PRESIDENT—T. C. Cole.

VICE-PRESIDENT—G. Austin.

COUNCIL—P. Barlow, S. Chapman, T. W. Rumble, G. Zimmer.

HON. SECRETARY AND TREASURER—H. H. Gray, 9, Thicket Road, Anerley, S E.

Talbot Circulating Photo-album Club.

Dates from 1886, when it was established for the monthly circulation and criticism of members' work. At the end of the year, each member receives an album with the criticism book accompanying it.

HON. SECRETARY—Fred H. Davies, 7, Temple Row, Birmingham.

Tooting Camera Club.

Formed July 29th, 1890, has its headquarters at Church School, Church Lane, Tooting Graveney, S.W., and its meetings on Thursdays (at least once a month).

PRESIDENT—A. H. Anderson.

VICE-PRESIDENT—J. H. Beckett.

COUNCIL—W. Irwin, H. Berger, J. F. Child, J. H. Collingwood.

HON. TREASURER—C. D'E. Stowell.

HON. SECRETARY—G. H. Dollery, "Glion," Lucien Road, Tooting Common, S.W.

Torquay Photo Association.

Formed August, 1889, with headquarters at Tredale's Lecture Room, Torquay, and meetings on the second Wednesday of the month; excursions to various places of interest are made during the summer months.

PRESIDENT—E. Vivian, M.A.

VICE-PRESIDENT—A. R. Hunt, M.A.

COUNCIL—W. Baynes, F. Briggs, J. Tozer, J. Dinham, J. Willoughby.

HON. TREASURER—H. C. Howell.

HON. SECRETARY - Geo. Edwards, Walnut Lodge, Chelston, Torquay.

Toynbee Camera Club.

Formed April, 1890, at Toynbee Hall, 28, Commercial St., Whitechapel, London, E. Laboratory and apparatus is provided for the use of members. Outings are organised during the summer. Sets of slides are arranged for loan to working men's clubs, &c. The annual general meeting is held the first week in April and ordinary meetings every Tuesday.

PRESIDENT—Rev. K. Jameson.

VICE-PRESIDENTS—F. E. Bartholomew and A. Price.

COUNCIL—T. W. Hull, W. H. Jennings, H. T. Malby, J. Sparling and G. West.

HON. TREASURER—J. E. Monk.

HON. SECRETARIES—A. E. Birch and T. W. Glare, 35, Heathland Road, Stoke Newington, London, N.

Tunbridge Wells Amateur Photographic Association.

Formed in 1887, has its headquarters at the Mechanics' Institute, Dudley Road, and holds its meetings on the first Thursday in the month at eight o'clock p.m. Excursions are also arranged during the summer. The annual meeting is held in January, and an exhibition in November. Members of recognised clubs and societies are welcome to attend the ordinary meetings as visitors upon giving notice in writing to the hon. secretary.

PATRON—Sir David L. Salomons, Bt.

PRESIDENT—F. G. Smart, M.A.

VICE-PRESIDENTS—Rev. A. T. Scott, M.A., Rev. J. E. Rogers, M.A., J. G. Calway, and D. Howard.

COUNCIL—J. W. MORGAN, A. W. Pierson, and E. Catchpole.

HON. AUDITOR—W. E. Brampton.

HON. TREASURER—B. Whitrow.

HON. SECRETARY—Joseph Chamberlain, 14, Calverley Park Gardens, Tunbridge Wells.

Tyneside Camera Club.

Formed September, 1891, its headquarters are at the Clarence Street Schools, Newcastle-on-Tyne, and its days of meeting Mondays. On alternate Mondays, there is a debate on some subject announced beforehand, or a paper or lecture. The other evenings are general conversational meetings. The dark room is open from 8 a.m. till 10 p.m. during the winter, and 6 a.m. till 10 p.m. during summer.

HONORARY PRESIDENT—Rev. Francis Hewitt.

ACTIVE PRESIDENT—J. F. McKie.

VICE-PRESIDENT—A. D. Rothwell.

COUNCIL—Messrs. McKie, Rothwell, Simpson, Birkett, Bell and Angus.

HON. TREASURER—Thos. Simpson.

HON. SECRETARY—Thos. Ord Birkett, Clarence Street Schools, Newcastle-on-Tyne.

Ulster Amateur Photographic Society.

Formed in 1886, its headquarters are at the Belfast Museum, and it meets on the second Monday in each month from October to April.

PRESIDENT—Alex. Tate, C.E.

VICE-PRESIDENTS—Wm. Swanston, F.G.S., John Brown.

COUNCIL—J. J. Andrew, E. Braddell, S. B. Coates, M.D., R. J. Evans, Wm. Gray, M.R.I.A., James Leslie, J. M'Clerry, J. Stelfoy.

HON. TREASURER—Robt. E. Workman, 19, Bedford Street, Belfast.

HON. SECRETARY—Dr. Cecil Shaw, 14, College Square E., Belfast.

University College Photographic Society.

Formed March, 1889, has its headquarters at University College, Gower Street, W.C., and meets on the second and fourth Tuesday of each month.

COUNCIL—H. Slater, E. C. C. Baly, M. W. Travers, G. M. Foster, J. C. Chorley.

HON. TREASURER—G. M. Foster.

HON. SECRETARY—John C. Chorley, University College, Gower Street, W.C.

Upper Holloway Cycling Club (Camera Division).

Dates its formation from 28th March, 1892, its headquarters are at Cordwainers' Arms, Elthorne Road, N., and its days of meeting the first and third Thursday in each month. Lantern concerts, photo exhibitions and competitions are held during the winter seasons and excursions with the cycling club in the summer.

PRESIDENT—J. T. C. Bartley, M.P.

VICE-PRESIDENTS—F. Mann, J. S. Cross, F. Dean.

COUNCIL—E. O. Neill, A. O. Hopwood, J. Gardiner, W. J. Royston, W. Dew, A. Gentle.

HON. SECRETARY AND TREASURER—Fredk. W. Timms, 5, Abercorn Terrace, Hatchard Road, Upper Holloway, N.

Uttoxeter Amateur Photographic Society.

Formed in 1890, with headquarters in Carter Street, Uttoxeter, its days of meetings are Wednesday, at 5.30 p.m. There is a dark room for the use of amateurs, admission to which can be obtained on presentation of card to the secretary.

PRESIDENT—Viscount Parker.

VICE-PRESIDENT—The Rev. C. F. L. Barnwell.

HON. TREASURER—R. T. A. Hardy.

HON. SECRETARY—Alfred Parker, High Street, Uttoxeter.

Viewfinders' Club.

Dates from March, 1890, and has headquarters at 31, Chambers Street, Edinburgh, meeting there on the first Monday in the month. It is limited to 21 members. Each in rotation submits his work for criticism of its artistic merits. General discussions on art are also held.

CONVENER—F. Dundas Todd, 29, Panmure Place, Edinburgh.

Wakefield and District Photographic Society.

Formed January, 1891, has its headquarters at the Technical and Art School. Its days of meeting are fixed by printed syllabus, and the membership is open to amateurs, professionals and ladies.

PRESIDENT—Alfred W. Stanfield, J.P.

VICE-PRESIDENTS—Isaac Briggs, J.P., and Captain Norwood.

COUNCIL—H. Crutchley, J. H. Chaplin, H. A. Halliwell, G. F. Firth, G. Campbell, G. Parkin.

HON. TREASURER—C. W. Richardson.

HON. SECRETARY—W. Townend, 21, King Street, Wakefield.

Wallasey Photographic Association.

Dates from 1885, its headquarters are at the Egremont Institute, Egremont, Cheshire, and it meets on Wednesdays.

PRESIDENT—Colonel E. T. D. Cotton-Jodrell, M.P.

VICE-PRESIDENTS—C. B. Reader and James Gill.

COUNCIL—H. B. Sharp, H. Wilkinson, A. E. Varcoe, J. Bardsley, W. Priestley, J. W. Gregg.

HON. TREASURER—J. Fullerton.

HON. SECRETARY—Geo. G. Breading, Church Street, Egremont, Cheshire.

Walton Photographic Society.

Established 1889, with headquarters at Arnot Street Schools, Walton, Liverpool, and meetings on the first Wednesday in each month, and an annual meeting in February.

PRESIDENT—Jno. Kennedy.

VICE-PRESIDENTS—H. E. Burn and G. Latimer.

COUNCIL—Messrs. Parke, Beaton, Sharrock, Burn, Murphy and Latimer.

HON. SECRETARY AND TREASURER—W. A. Brown, 20, Richmond Terrace, Breck Road, Liverpool.

Warrington Amateur Photographic Society.

Dates its formation from December 14th, 1886, and has headquarters at the Museum, Warrington, where its members meet on the last Tuesday in each month.

PRESIDENT—Thomas J. Down.

VICE-PRESIDENTS—Wm. Pierpoint and H. N. Houghton.

COUNCIL—P. Dalton, H. Bond, J Fairhurst, J. Skelton, J. Harding (Eustace Street), J. Harding (Liverpool Road), G. Kirby, J. Hallows, Thos. Welsby, H. Pritchard, C. B. Aylwood, with president and vice-presidents.

HON. TREASURER—Peter Dalton.

HON. SECRETARY—Fredk. Pearson, Stockton Heath, Warrington.

West Kent Amateur Photographic Society.

Formed in 1888, with headquarters at the Station Hotel, Sidcup, and Board Room, Bexley, meets fortnightly.

PRESIDENT—Andrew Pringle.

VICE-PRESIDENT—A. R. Dresser.

COUNCIL—Messrs. Jones, Reeves, Court, Taylor, Nash, Hastings, Mourdant.

HON. SECRETARY AND TREASURER—Edward Hawkins, Manor Estate, Sidcup, Kent.

West London Photographic Society

Was founded in 1888. Its headquarters are at the Chiswick School of Arts and Crafts, Bedford Park, W., and its technical meetings of a social character are held on dates fixed by the Council. Outdoor meetings are held in the summer months, and an annual exhibition of members' work on the second Friday in January; and its ordinary meetings on the second and fourth Friday of the month.

PRESIDENT—Walter Adam Brown.

VICE-PRESIDENTS—C. Bilton, W. L. Colls, John A. Hodges, Dr. F. H. Low.

COUNCIL—J. J. Adam, J. D. England, R. Horton, G. Lamley, A. W. Scanlan, H. Selby, G. E. Varden, C. Whiting, J. Wilson, C. Winter.

HON. TREASURER—W. H. Whitear.

HON. SECRETARY—Lionel C. Bennett, 30, Blandford Road, Bedford Park, W.

West Surrey Photographic Society.

Formed March, 1887, its headquarters are at St. Mark's Vestry Hall, Battersea Road, and its meetings on the first and third Wednesday in each month. Outings are held during the summer months. Public lantern exhibitions and an annual exhibition are held in March each year.

PRESIDENT—J. Gale.

VICE-PRESIDENTS—G. Davison, J. L. Lyell and W. Winsford.

COUNCIL—Messrs. James, Martin, Graham, Wilshere, Bull, Ward, Seward.

HON. LIBRARIAN—E. Swingler.

HON. SECRETARY—F. H. Smith, 107, Falcon Road, Clapham Junction, S.W.

Wigan Photographic Society

Dates its formation from October, 1890, has headquarters at the Victoria Restaurant, King Street, Wigan, and meets fortnightly on Wednesdays, and the annual meeting is the first meeting in September.

PRESIDENT—H. H. Wragg.

VICE-PRESIDENT—J. A. E. Lowe.

COUNCIL—Rev. J. S. Barnes, M.A., W. A. Varley, J. Smith, F. Hughes, J. H. Atherton, W. Heaton, and R. Wardman.

HON. SECRETARY AND TREASURER—Fred. Betley, 11, Swinley Road, Wigan.

Wimbledon Amateur Photographic Society.

Dates from December, 1890, and holds its meetings at the Drill Hall on alternate Fridays.

PRESIDENT—H. Como Bonsor, M.P.

HON. TREASURER—John H. Oliver.

HON. SECRETARY—Rev. H. G. Allfree, 28, King's Road, S. Wimbledon.

Wolverhampton Photographic Society.

Formed in June, 1888, has its headquarters at the Blind Institute, Victoria Street, and holds meetings on the first Tuesday in the month.

PRESIDENT—Harold Holcroft.

VICE-PRESIDENT—Lyons Wright.

COUNCIL—T. Ironmonger, J.P., J. Stokes, E. A. White, S. R. Rhodes, W. Ratcliffe, J. M. Taylor, W. E. Oakley, W. R. German.

HON. TREASURER—F. J. Gibson.

HON. SECRETARIES—J. W. Evans and J. Gale, 52, Darlington Street, Wolverhampton.

Worcester Amateur Photographic Society.

Formed in March, 1890, with headquarters at the Guildhall, Worcester. Meets on the first Tuesday in each month.

PRESIDENT—W. R. Higgs.

VICE-PRESIDENT—W. Webb.

COUNCIL—W. A. Firkins, J. Cam, W. H. Cam, J. Hobson, T. James, T. B. Judson.

HON. SECRETARY—F. G. Jones, 5, Foregate Street, Worcester.

Worcestershire Camera Club.

Dates from May, 1888, and has its headquarters at the School of Science, Kidderminster, where meetings are arranged by notice. This club makes a special feature of summer excursions, as well as lectures, demonstrations, &c.

PRESIDENT—M. Tomkinson, J.P.

VICE-PRESIDENTS—Albert Cowell, Arthur Comber, C.E.

COUNCIL—Miss C. Badland, Miss E. Cowell, C. J. Carter, J. S. Hussey, and C. Walker.

HON. TREASURER—B. Hepworth.

HON. SECRETARY—Acton T. Bucknall, Franche Court, Kidderminster.

Worcester Tricycle Club (Camera Section).

Dates its formation from 7th April, 1892, its headquarters are at the Bell Hotel, Worcester, where its members meet every Thursday. This camera section gives facilities to wheelmen, who are also cameraists, to visit in congenial company the many beautiful spots in Worcestershire, specially known to the brethren of the wheel.

PRESIDENT—A. Gyngell.

COUNCIL—J. Cam, W. Cam, F. E. Hill, S. Hill, T. James and J. F. Santonna.

HON. TREASURER—F. E. Hill.

HON. SECRETARY—Thos. J. Hobson, Laurel Villa, Boughton Street, St. John's, Worcester.

Wylde Green Camera Club.

Formed in 1889, with headquarters at the Town Hall, Sutton Coldfield, and meetings on the last Friday in the month. Excursions are arranged in the summer months to places of interest in the neighbourhood.

PRESIDENT—Dr. A. H. Evans.

VICE-PRESIDENTS—J. B. Stone, J.P., F.L S., F.G.S., &c , H. H. Plant, J.P., A. H. Dugard.

COUNCIL—C. J. Fowler, W. Betts, jun., H. Billson.

HON. TREASURER—T. S. Hooper.

HON. SECRETARY—C. Harold Harcourt, The Sycamores, Sutton Coldfield, Warwickshire.

York Photographic Society.

Dates from 1887, its headquarters are at Cumberland Hall, York, and it meets on the first Tuesday in each month.

PRESIDENT—F. Vincent.

VICE-PRESIDENT—H. C. Swailes.

COUNCIL—Messrs. Pawson, Hick, Ogden, and Redpath.

HON. LANTERNIST—J. Dickinson.

HON. TREASURER—R. Bainbridge.

HON. SECRETARY—F. G. Benson, 50, Scott Street, York.

Yorkshire Philosophical Society (Photographic Section).

Formed in 1888, has its headquarters at the Museum, York, and its meetings on the first Wednesday, monthly.

PRESIDENT—Tempest Anderson, M.D., B.Sc.

VICE-PRESIDENTS—W. Monkhouse, John N. Kitching.

COUNCIL—J. T. Atkinson, H. D. Taylor, H. Bateman, and B. Wales.

HON. TREASURER—Henry R. Moiser, F.G.S.

HON. SECRETARY—Henry R. Moiser, F.G.S., Heworth Grange, York.

THE SALE OF IMPERIAL PLATES

IS RAPIDLY INCREASING,
AND TESTIMONIALS ARE ARRIVING BY EVERY POST.

Mr. WEBB, of Clapton, says:

"Many thanks for samples. I find that I obtain better results with your Plates than any other make. I can confidently recommend them as the best I have used."

OTHERS SAY THE SAME AND MORE.

SAMPLE BOX OF ONE DOZ. ¼ OR ½ DOZ, ¼ PLATES, 1- POST FREE.

OUR LATEST INTRODUCTION

IS A

NEW ROUGH MATT SURFACE PAPER

GIVING THE MOST ARTISTIC RESULTS.

For toning with gold or platinum. Sample sheet, post free, 1/-

Full Price List of Plates and Papers post free on application.

THE IMPERIAL DRY PLATE COMPANY,

LIMITED,

CRICKLEWOOD, LONDON, N.W.

TRADE MARKS

WHICH HAVE BEEN

REGISTERED

IN CONNECTION WITH

PHOTOGRAPHIC APPARATUS

AND

MATERIAL.

1892.

List of BOOKS, MAPS, &c.

ILIFFE & SON, 3, St. Bride Street,

LUDGATE CIRCUS, E.C.

PHOTOGRAPHIC BOOKS, &c.

s. d.

"Photography" Annual (Vol. II.), **for 1892.**—Published in May. Edited by Henry Sturmey. A compendium of information and statistics of the year. Demy 8vo. Cloth, gilt lettered, 3/6 (postage 7½d.) Paper cover (postage 6d.) 2 6

The American Annual of Photography and *Photographic Times* Almanac, for 1892.—Royal 8vo., with two dozen full-page plates, whole cloth (postage 6d.) 3 6

International Annual of Anthony's Photographic Bulletin (postage 4½d.) A few copies of Vols. I., II., III. and IV. 2 0

The Encyclopædia of Photography.—By Walter E. Woodbury; with over 1,000 References, and illustrated with 200 explanatory diagrams and sketches. Cloth, gilt lettered (postage, 6d.) ... *In preparation.* 7 6

Processes of Pure Photography.—By W. K. Burton and Andrew Pringle (postage 4½d.) 4 6

The Science and Practice of Photography.—A complete Manual on this fascinating Art.—By Chapman Jones. Fully illustrated. New and Revised Edition. Crown 8vo. (postage 4½d.) (Cloth, 3s. 6d.) 2 6

The Photographers' Indispensable Handbook, 1887.—Compiled by Walter D. Welford. Edited by Henry Sturmey. Every possible variety of apparatus and photographic requisite is illustrated and described (postage 4½d.) 2 6

Photography for All.—An Elementary Text Book and Introduction to the Art of Taking Photographs.—By W. Jerome Harrison, F.G.S., Author of "A History of Photography." Crown 8vo. Illustrated (postage 2d.) 1 0

Beginner's Guide to Photography (postage 2d.) 0 6

Photography In a Nutshell.—By "The Kernel." Crown 8vo. New edition, enlarged (postage 2d.) (Cloth, gilt lettered and Interleaved for Memoranda, 2s. 6d.) (postage 3d.) 1 0

Photography for Architects.—By F. W. Mills, author of "The Art and Practice of Interior Photography." Demy 8vo. Cloth, Illustrated (postage 3d.) 2 6

The Art and Practice of Interior Photography.—By F. W. Mills. Demy 8vo. Cloth, Illustrated. (postage 3d.)... ... ... 2 6

Practical Photo-Micrography.—By Andrew Pringle. Cloth, gilt lettered. Illustrated (postage 6d.) 10 6

Practical Index of Photographic Exposure.—By A. R. Wormald (postage 1d.) 1 6

Collotype and Photo-Lithography.—By Dr. Julius Schnaus. Translated with the Author's sanction and assistance by Edwin C Middleton, with an Appendix on Steam Presses by the Translator (postage 4½d.) 5 0

Materia Photographica.—By C. J. Leaper, F.C.S. A treatise on the manufacture, uses and properties of the substances employed in photography. A Handbook for Schools and Classes and for private use. Crown 8vo. Cloth, 250 pages, largely illustrated (postage 3d.) 5 0

Photogravure.—By W. T. Wilkinson, with Illustrations (postage 1d.) ... 1 6

Military Photography.—By O. E. Wheeler, late Captain The Leicestershire Regiment (postage 1½d.) 1 6

The Indispensable Handbook to the Optical Lantern, 1888.—By W. D. Welford and Henry Sturmey (postage 4½d.) 2 6

Lantern Slides and How to Make Them.—By A. R. Dresser (postage 1d.) 0 6

The Magic Lantern.—Its Construction and Use (postage 1½d.) 0 6

Photographic Pastimes.—Translated from the German by Hermann Schnauss. With numerous diagrams and illustrations (postage 3d.) 1 0

Photography Applied to the Microscope.—By F. W. Mills. Cloth (postage 3d.) 2 0

BOOKS—continued.

s. d

Photography as a Business.—By H. P. Robinson. To the novice commencing business this is indispensable. It should also be in the hands of all who desire to improve their business. Twelve chapters. With Frontispiece. (Cloth 1/6) postage 1½d. 1 6

The Amateur Photographer's First Handbook.—A complete guide and instructor in the art of modern photography. Illustrated. Sixth edition (postage ½d.) 0 6

A History of Photography —A practical guide and an introduction to its developments, by W. Jerome Harrison, F.G.S., with an Appendix by Dr. Maddox on the Discovery of the Gelatino-Bromide Process. Second edition. Demy 8vo. 150 pages. (Cloth 3/6; post free 3/9.) Postage 2½d. 1 0

Bromide Paper.—Instructions for Contact Printing and Enlarging, by Dr. E. A. Just. Translated by Walter E. Woodbury and H. Snowden Ward. With bromide paper frontispiece and upwards of 30 illustrations in the text. Demy 8vo (postage 3d.) 1 0

The Practical Ferrotyper.—By H. Snowden Ward. A complete instruction book for the "wet" ferrotype process (postage 1d.) 0 6

The Pocket Exposure Note Book – Convenient size for the waistcoat pocket. Ruled and printed for nearly 300 exposures. Spaces are provided for No. of plate, date, subject, light, plate, lens, stop, hour, seconds, remarks. Bound cloth (postage ½d) 0 3

Ditto superior edition, with pencil and pocket for memoranda (postage ½d.)... 0 6

Photographic Labels.—Book containing over 100 printed, gummed, and perforated labels for all photographic chemicals and requisites (postage ½d.) ... 0 6

The Optical Lantern for Instruction and Amusement — By Andrew Pringle, F.R.M.S. This is a copyright English edition, revised to date by the author and published at about half the price of the American issue. Demy 8vo. Illustrated. Half cloth (postage 3d.) 2 6

The Lighting in Photographic Studios.—By P. C. Duchochois. Crown 8vo. With diagrams. Half cloth (postage 1½d.) 1 6

Practical Enlarging.—By JOHN A. HODGES, Vice-president of West London Photo Society. Crown 8vo. (Cloth 2/-.) Postage 2d. 1 0

The First Principles of Photography.—By C. J. Leaper, F.C.S. Crown 8vo, cloth (postage 3d.) 5 0

The Hand Camera and How to Use It.—By Walter D. Welford. Cloth 2/- (postage 2d.)... ... ... *In the Press.* 1 0

BOOKS FOR CYCLISTS, TOURISTS, &c., &c.

My Cycling Friends.—Designed and compiled for Collection of Autographs. By C. Alan Palmer (postage 2½d.) 2 0

The Cyclist Diary for 1892.—Lots of useful information (postage 1d.) Leatherette 1/- French Morocco 1 6

The Bicyclists' Indispensable Handbook.—Sixth Edition. 18th thousand, 1887. By Henry Sturmey. Profusely illustrated (postage 4½d.) ... 2 6

The Pleasures, Objects, and Advantages of Cycling.—By "Faed." Profusely illustrated. Interesting to everyone (postage 2d.)... ... 1 0

Tips for Tricyclists.—By Professor Hoffmann, C.T.C., N.C.U., N.L.T.C. With numerous illustrations. Revised and Enlarged. In square foolscap 8vo., stiff boards (postage 2d.) 1 0

Art and Pastime of Cycling.—By R. J. Mecredy and A. J. Wilson. New Edition. Completely Re-written and Enlarged (postage 4½d.) 2 0

Cycling Art, Energy, and Locomotion.—By Robert P. Scott. Illustrated (postage 4½d.) 8 0

The Art of Training for Cycle Racing.—By G. L. Hillier and T. H. S. Walker. In English, German, and French (postage 4½d.) 5 0

Training for Amateur Athletes.—By H. L. Cortis, M.D. 10th thousand. Crown 8vo. (postage 1d.) 1 0

Physical Training for High Speed Competition.—By Percy Furnivall (postage ½d.) 0 2

Tricycling for Ladies.—By Miss F. J. Erskine. Second Edition. Every lady should read this book. Crown 8vo. (postage 1d.) 0 6

The Water Cycle.—By J. Morton Hale (postage 1d.) 1 0

BOOKS—continued. s. d.

Points for Cyclists (postage ½d.) 0 3

Phillips's Abridgments of Cycling Patents.—From 1818 to end of 1883 ... ... 21 0
Ditto ditto for 1884 ... ... 10 6

The Rights and Liabilities of Cyclists.—By John A. Williamson, Solicitor. Second Edition. Crown 8vo. (postage 1d.) 0 6

A Tandem Tour in Norway. An Account of a Trip in 1887.—Crown 8vo., with ten folding Lithographs (postage 2d.) 1 0

Through the Ardennes and Luxemburg on Wheels.—By W. A. Ellington, C.T.C., Chateris B.C. and Guy's Hospital B.C. Illustrated (postage 1d.) 0 6

Nauticus in Scotland: A Tricycle Tour of 2,500 Miles.—Third Edition. Illustrated. Demy 8vo., paper cover (postage 3d.) 2 0

Two Trips to the Emerald Isle.—By "Faed." Illustrated. Foolscap 4to. (postage 1½d.) 1 0

Health upon Wheels; or, Cycling as a Means of Preserving and Restoring the Vital Powers.—By Gordon Stables, M.D. (postage 2d.)... .. 1 0

Rota Vitæ. The Cyclist's Guide to Health and Rational Enjoyment.—By Gordon Stables, C.M., M.D., R.N. (postage 2d.) 1 0

Cycling and Health (La Sante par le Tricycle).—By Oscar Jennings, M.D. Paris. Translated from the Second French Edition by J. Crosse Johnston (postage 3d.) 1 0

Hints to Lady Travellers: At Home and Abroad.—By Lillias C. Davidson. Crown 8vo. Cloth (postage 3d.) 3 6

Colloquial German for Travellers.—By H. Swan. Being a collection of Phrases most useful to Tourists, with the exact pronunciation, and a chapter specially for cyclists (postage 1½d) 1 6

Colloquial Italian for Travellers.—Companion to above (postage 1½d.) 1 6

Colloquial French for Travellers.—Companion to above (postage 1½d) 1 0

Poppy Land: Papers descriptive of Scenery on the East Coast.— By Clement Scott. (Postage 1½d.) 1 0

Seaside Watering Places: A description of holiday resorts on the Coasts of England and Wales, the Channel Islands, and the Isle of Man. Illustrated (postage 4½d.) 2 6

Inland Watering Places of Great Britain and Ireland, being descriptions of the Spas, their Mineral Waters, and their Medical value, Illustrated (postage 4½d) 2 6

New Holidays in Essex, with Rail and Walking Routes, Boating, Fishing, and Shooting Notes. Illustrated (postage 2d.) 0 6

Walks in Epping Forest.—A Handbook to the Forest Paths, with Cycling and Driving Routes. Illustrated (postage 2d.) 0

Walks in the Ardennes, with Boating, Fishing, Cycling and Shooting Notes. Illustrated (postage 2d.) 0 6

Walks in Holland.—Companion to above (postage 2d.) 0 6

Tourists' Guide to the Continent, with Map and numerous Illustrations (postage 2d.) 0 6

The Most Picturesque Routes in Southern Norway, with Map and Illustrations (postage 1d.) 0 6

Holidays in Belgium.—A cheap Continental Trip, including Antwerp, Brussels, Waterloo, and the picturesque Cities of Old Flanders (postage ½d.)... 0 1

The Hartz Mountains.—Describing new, cheap Tours in North Germany. (postage ½d.) 0 1

The Moselle.—From the Franco-German Battlefields to the Rhine (postage ½d.) 0 1

A Trip to the Ardennes.—Including the Meuse, Namur, Dinant, Spa, &c. (postage ½d.) 0 1

Holidays in Holland.—Including Amsterdam and North Holland (postage ½d.) 0 1

Tourists' Travel Talk.—A Vocabulary of Everyday Words and Phrases in French, German, and English (postage ½d.) 0 1

ILIFFE & SON, 3, ST. BRIDE ST., LUDGATE CIRCUS, E.C.

GUIDE BOOKS. s. d.

The Cyclists' Route Book of Great Britain and Ireland.— By W. J. Spurrier, C.T.C.; with Map of England and Wales, in five sections, showing bad roads, dangerous hills, etc. (postage 3d.) 1 0

The Roads of England and Wales: An Itinerary for Cyclists, &c.— By Charles Howard (Hon. Sec. Wanderers B.C., and C.T.C.) 423 pages. Fifth Edition, Limp cloth, with special large scale map of England 6 0

The Roads of Scotland.— Companion to above (postage 2d.) 2 6

Specially Surveyed Roads in Scotland. A Guide for Cyclists, Pedestrians, and Sportsmen.— By G. R. Brayshay, C.C. C.T.C. With Map (postage 2d.) 5 0

The Cyclists' Road Book of England.—By Charles Spencer. New large map, thoroughly revised (postage 2½d.) Cloth 1s. 6d.... ... . 1 0

The Handy Route Book of Southern England.—By Charles Howard (Hon. Sec. Wanderers B.C., and C.T.C.) Second Edition. With large scale map (postage 2d.) 1 0

The Handy Route Book of Middle England.—Companion to Southern England. With map (postage 2½d.) 2 0

The Way About Surrey, with Map and Illustrations, 1891 (postage 2d.) ... 1 0

MISCELLANEOUS BOOKS.

What They Think About It.—A humorous criticism with pen and pencil on Bicycling for Ladies. By W. A. Bettesworth. Royal 4to. (postage 1d.) ... 1 0

The Isle of Man.—Humorous Notes and Sketches on the Island, and the people met there. By W. A. Bettesworth. Royal 4to. (postage 2d.) 1 0

A Royal Road to Cricket.—A collection of Curious Sketches and Advice on the Game of Cricket. By An Old Sussex Cricketer (W. A. Bettesworth). Royal 4to. (postage 2d.) 1 0

The Cruise of the "Wanderoo;" or, Friday Nights at Sea.—By Gordon Stables, C.M., M.D. Crown 8vo. (postage 2d.) 1 0

The Village Beauty, and other Verse Tales, for Recitation.— By Reginald W. Cann (postage 1d.)... ... ... 1 0

Common Sense about Food and Physic.—A popular practical Manual. By Gordon Stables, M.D., R.N. (postage 2d.) 1 0

Our Colds, How Caught, Prevented, or Cured, by G. W. Bacon, F.R.G.S. (postage ½d.) 0 3

Indian Clubs, and How to Use Them.—By E. Ferdinand Lemaire, German Gymnastic Society, &c. With 218 Illustrations by the Author (postage 4½d.) 5 0

How to Win at Nap (The Secret Out).—Fourth Edition. No player should be without this book (postage 1½d.) 1 0

The Book of Card Tricks.—By Professor R. Kunard. Illustrated (postage 3d.) 2 6

Games of Patience (for one or more players).— By Miss Whitmore Jones. Second series. Illustrated (postage 2d.)... ... ... 1 0

Billiards, The Art of (for Amateurs).—By A. W. Drason, F.R.A.S. Illustrated (postage 2d.) 1 0

Games of Pool.—Describing the various English and American Pool Games, and giving the Rules in full. By C. Compton Moore. Illustrated (postage 2d.) 1 0

W. G. Grace.— A Biography by W. Methven Brownlee, with a **Treatise on Cricket** contributed by W. G. Grace. A life-like portrait and an autograph letter. Sixth Edition. Crown 8vo. (postage 2d.) 1 0

The All England Series— Cycling, Boxing, Swimming, Cricket, Golf, Lawn Tennis (postage 2d) ... ... each 1 0

Do. do. Sailing, Gymnastics, (postage 2½d.) ... each 2 0

The Book of Modern Conjuring.— By R. Kunard, with 133 illustrations (postage 3d.) 2 6

How to Make Money by Patents.— By H. H. Murdoch, F.M.I.P.A. ... 1 0

Practical Dynamo Building for Amateurs.—By F. Walker, M.E. How to Wind for any Output. Second Edition. Illustrated. Cloth (postage 1½d.) 2 0

ILIFFE & SON, 3, ST. BRIDE ST., LUDGATE CIRCUS, E.C.

BOOKS—Continued. s. d.

Tables and Memoranda for Electrical Engineers.—By F. Walker, C.E., containing much useful information. Cloth, bound in pocket-book form, with elastic band, interleaved with white paper (postage 1d.) ... 2 0

Intensity Coils.—How made and how used, also Electric Light, Telephone, Phonograph, &c. (postage 2d.) 1 0

The Mystic Serpent.—A Novel of the Period, by Saumarez de Havilland, Author of "Strange Clients," "Ritherdons Grange," &c., &c. (postage 6d.) ... 6 0

Strange Clients and Other Tales.—By Saumarez de Havilland. A first-rate collection of tales for railway reading (postage 2d.) 1 0

Duffersville.—By Faed an Nym. A story of the North Road. Cloth (postage 2d.) 1 0

Sunday Talks on Topics of the Time.—By Rev. J. S. Nye. Foolscap 8vo. (postage 1½d.) 0 6

Maidenhood. A General Talk to Girls.—By Doris (postage ½d.) 0 2

MAPS.

Tourists' Route Map of England and Wales, with 30 main routes coloured, and lists of places *en route*, and distances from London. Mounted on linen 1 0

Cycling Road Map of England and Wales.—Showing the main roads specially coloured. Folded in case 1 0
Ditto ditto on cloth 2 6

England and Wales in Seven Sheets.—Five miles to the inch. Main roads conspicuously coloured. Important names in bold letters. Price per sheet 1 0
Ditto ditto printed on *flexible cloth*. Most valuable in wet or windy weather. Price per sheet 2 6
Index to sheets post free on application.

England and Wales in 65 Sheets.—½in. to the mile. Size of sheet, 22in. x 27in. Price per sheet 1 0
Ditto ditto mounted on cloth 1 6
Index to sheets post free on application.

150 Miles Round London.—8 miles to inch 1 0
Ditto ditto on cloth 2 6

100 Miles Round London, with roads distinctly coloured and hills indicated. Scale, 6 miles to inch. Folded, in case. (On cloth, 5s.) 2 6

50 Miles Round London, showing dangerous hills. Scale, 4 miles to inch. In case. (On cloth, 5s.) 2 6

50 Miles Round London, The Way-about Map of (postage ½d.) 0 1

25 Miles Round St. Paul's.—Scale, 2 miles to inch. (Cloth 2s.)... ... 1 0

20 Miles Round London.—In four sheets, N.W., N.E., S.W., S.E., 1 inch to mile. Price per sheet 1 0
Ditto ditto on cloth 2 6

60 Miles North of London, ½in. scale (cloth 2s.) 1 0

Cyclist Road Map of the Environs of London.—Embracing an area of more than 2,500 square miles, with guide to places of interest. Folded in case. Scale, 2 miles the inch. (On cloth, 2s. 6d.)... ... ... 1 0

Country Round London.—From Windsor to Rochester and Dorking to St. Albans. Main roads, &c., coloured. With small inset map of London ... 1 0
Ditto ditto mounted 2 6

London and Suburbs.—Large print, with Index to Streets and Illustrated Guide. (Mounted on cloth 2s. 6d.) 1 0

Suburbs of London.—1in. scale. On paper, 6d. Mounted on cloth ... 1 0

The Streets of London.—On flexible cloth in case 1 0

Map and Guide to London.—With Index to 4,000 Streets, Scale 5in. to the mile. On paper 1 0

Epping Forest.—Official Survey. All latest improvements (postage ½d.) ... 0 2

County Maps, showing hills in three different degrees of danger, where C.T.C. Consuls and Hotels may be found, and where machines may be repaired. Yorkshire is in four parts—N.W., N.E., S.W., S.E. Wales in two—N. and S. Isle of Wight. Isle of Man. Mounted on cloth, in neat case each 1 0
Ditto ditto mounted in superior style, in cloth case... ... ... 1 6

MAPS—Continued. s. d.

Crutchley's County Maps.—Mounted on Cloth, in case (2½ miles to inch) 1 0
Ditto ditto in paper cover (2½ miles to inch) 0 6

Up and Down the River Thames.—From Oxford to Gravesend. Map on cloth and Gulde 0 6

Scotland, showing all places in Scotland; road, rail and water communication; with the mountains, hills and lochs. Scale, 12 miles to inch. Folded in case 1 0
Ditto ditto on cloth 2 6

Ireland.—Specially suitable for tourist and cyclist 1 0
Ditto ditto on cloth 2 6

France.—On tough paper. Folded... ... ... 2 6

PERIODICALS.

Subscription Forms upon application.

THE CYCLIST and Bicycling and Tricycling Trades' Review.—Edited by Henry Sturmey. Every Wednesday (postage ½d.) ... 0 1
Binding Case for vol. (postage 3d.) 2 0

BICYCLING NEWS and the Tricycling Gazette. (The Cyclists' Illustrated Paper.) Every Friday (postage ½d.) 0 1
Binding Case for vol. (postage 3d.)... ... ... 2 0

PHOTOGRAPHY: The Journal of The Amateur, The Profession, and the Trade.—Every Thursday (postage ½d.) 0 1
Binding Case for vol. (postage 3d.) 1 6
Handsome Reading Cases (postage 3d.) 2 0

PHOTOGRAPHIC REVIEW OF REVIEWS.—Edited by WALTER D. WELFORD. Illustrated. Published 15th each month. No. 1, January, 1892 (postage 1d.) 0 6

THE IDLER.—A Monthly Magazine. Edited by Jerome K. Jerome and Robert Barr. Illustrated (postage 2½d.) 0 6

THE "COLLIGO" PORTFOLIO AND READING CASE, for any Newspaper, Magazine, or Periodical. Detailed Price List on application.

Postages quoted are for the United Kingdom. Foreign postage extra.

Any book obtained to order. Customers when ordering should always enclose sufficient to cover postage. If too much is sent it will always be returned.

ILIFFE & SON

Undertake Printing and Publishing of all kinds of Books and Periodicals.

ESTIMATES AND PARTICULARS UPON APPLICATION.

3, ST. BRIDE STREET, LUDGATE CIRCUS,

LONDON, E.C.

J. C. DAWBARN, MANAGER.

Telegraphic Address:
"Cyclist, London."

Authors are invited to submit MSS. for estimates for printing and publishing.

SECTION VIII.

PHOTOGRAPHIC TRADE MARKS.

FOR the first time in the history of the Photographie Literature the Trade Marks which have been registered in connection with the Photographic Trade are presented in concise and readily referable form to the public. The compilation has been carried out specially for PHOTOGRAPHY ANNUAL by Mr. R. E. Phillips, the well-known patent agent, of 57, Chancery Lane, London. Needless to say, the compilation and the engraving of the necessary illustrations has been a matter of considerable expense, which, however, has not been spared in the effort to make PHOTOGRAPHY ANNUAL a really comprehensive reference book, and of practical value and interest to the members of the photographic trade. It will be, perhaps, needless to remark that many of the designs figured below have never been used for photographic goods, but as they have been registered for use in connection with articles of this nature, other traders are necessarily barred from adopting them.

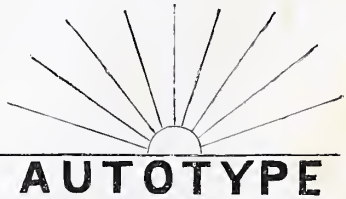


No. 465, Cl. 1, Jan. 10th, 1876.—Acids, including vegetable acids, alkalies, artists' colours, pigments, mineral dyes, and photographic chemicals. CHARLES BOORNE, CHARLES TOWNSEND, and JOHN BOUCHER, trading as Ferris and Co., Union Street, Bristol, wholesale druggists, manufacturing and pharmaceutical chemists, and manufacturers of surgical and philosophical instruments and apparatus.



Company, Cook Street, Glasgow, paint varnish, and grease manufacturers.

No. 650, Cl. 1, Jan. 13th, 1876.—Chemical substances used in manufactures, photography, or philosophical research, that is to say, paints, pigments, glue, size and varnishes. HUGH MACBEAN, principal partner of and on behalf of the firm of H. MacBean and

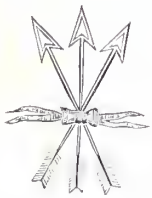


No. 886, Cl. 1, Jan. 17th, 1876.—Chemical substances used in the manufacture of permanent photographic paper and pictures, such as bichromates, gelatine, artists' colours and pigments. WALTER STRICKLAND BIRD, on behalf of self and partner, John

Robert Mather Sawyer, trading as The Autotype Company, 36, Rathbone Place, Middlesex.



No. 1523, Cl. 1, January 29th, 1876. —Chemical substances used in manufactures and photography. Henry Sudgen Evans, of and on behalf of the firm of Evans, Lescher, and Evans, 60, Bartholomew Close, London, E.C., and also of and on behalf of the firm of Evans, Sons and Co., 56, Hanover Street, Liverpool, wholesale druggists.



No. 2274, Cl. 1, Feb. 17th, 1876.—Chemical substances used in manufactures, photography, or philosophical research, such as aniline colours, nitrate of silver. George Stephen Woolley, of and on behalf of the firm of James Woolley, Sons and Co., 69, Market Street, Manchester, Lancashire, wholesale druggists and manufacturing pharmaceutical chemists.



No. 2915, Cl. 1, Feb. 29th, 1876.—Phosphorus, amorphous phosphorus, chlorate of potash, precipitated sulphur, used in manufactures, photography or philosophical research. Arthur Albright, of and on behalf of the firm of Albright and Wilson, Oldbury, Worcestershire. Manufacturers of phosphorus and chemical compounds.



No. 2916, Cl. 1., Feb. 29th, 1876.—Phosphorus, amorphous phosphorus, chlorate of potash, precipitated sulphur, used in manufactures, photography, or philosophical research. Arthur Albright, of and on behalf of the firm of Albright and Wilson, Oldbury, Worcestershire, manufacturers of phosphorus and chemical compounds.



No. 4418, Cl. 1, Mar. 31st, 1876.—Chemicals for use in photography. Herbert Kerr, of and on behalf of the firm of Chambers & Co., 251, Goswell Road, London, manufacturers.



No. 5110, Cl. 1, April 24th, 1876.—Chemical substances used in manufactures, photography, and philosophical research. August Wilhelm Kahlbaum, trading as C. A. F. Kahlbaum, 19, Muenz Street, Berlin, Germany, manufacturing chemist and distiller.

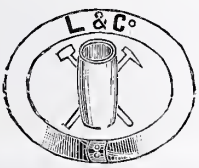


No. 5404, Cl. 1, May 6th, 1876.—Chemical substances used in manufactures,

photography, or philosophical research, such as acids, alkalies, pigments, mineral dyes. WILLIAM F. WYLEY, on behalf of self and partners, John Wyley, Francis Wyley, and George Walker, trading as Wyleys and Co., Hertford Street, Coventry, wholesale chemists.



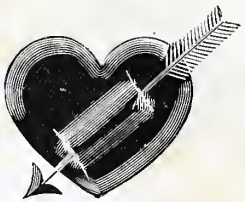
No. 6355, Cl. 1, June 2nd, 1876.—Artists' colours, photographic chemicals. WILLIAM WHITELEY, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, and 14A, Westbourne Grove, and 147, 149, 151, and 157, Queen's Road, Bayswater, Middlesex, universal provider.



No. 9715, Cl. 1, Nov. 27th, 1876.—Chemical substances nsed in manufactures, photography or philosophical research, such as nitrate of silver and chloride of gold. ALFRED LUTSCHAUNIG, Liverpool, Lancashire, assayer and analytical chemist.



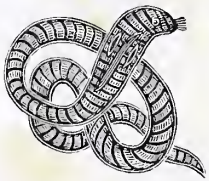
No. 9994, Cl. 1, Dec. 5th, 1876.—Chemicals used in manufactures, photography, or philosophical research MAX NEUSTADT, trading as Max Neustadt & Co., 25, Mincing Lane, London, drug, chemical, and albumenised paper merchant.



No. 10011, Cl. 1, Dec. 6th, 1876.—Chemical substances used in manufactures, photography or philosophical research, such as alkali, chlorate of potash, acids, and chemicals of all kinds included in Class 1. WILLIAM JONES MENZIES, managing director of and on behalf of the Greenbank Alkali Company, Limited, Saint Helens, Lancashire, manufacturing chemists.



No. 10131, Cl. 1, December 11th, 1876.—Chemical substances used in manufactures, photography and philosophical research, such as mineral and vegetable acids, alkalies, artists' colours, pigments, mineral dyes, and varnishes. ARNOLD BAISS, of and on behalf of the firm of Baiss Brothers and Company, Jewry Street, London, wholesale druggists, manufacturing chemists and druggists' sundriesmen for exportation.



No. 11722, Cl. 1, Apr. 19th, 1877.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. MONEYLALL SAHA, Calcutta, dealer in drugs.

CHROMOTYPE

No. 12171, Cl. 1, May 25th, 1877.—Chemical substances used in the manufacture of permanent photographic paper and pictures, namely, bichromates, gelatine, artists' colours, and pigments. Walter Strickland Bird, on behalf of self and partner, John Robert Mather Sawyer, trading as the Autotype Company, 36, Rathbone Place, Middlesex, photographers.



No. 12451, Cl. 1, June 26th, 1877.—Chemical substances used in manufactures, photography or philosophical research, namely, artists' colours and pigments. Antoine Ernest Ringaud, jun., on behalf of self and partner, Charles Meyer, 33, Rue Grange aux Belles, Paris, France, colour manufacturers.



No. 12773, Cl. 1, July 21st, 1877.—Chemical substances used in manufactures, photography, or philosophical research. Julius Friedrich Holtz, director and manager of The Chemischen Fabrik auf Actien (formerly E. Schering), Berlin, Germany, manufacturers of chemicals.



No. 13046, Cl. 1, Aug. 31st, 1877.—Chemical substances, such as phosphorus, phosphate of soda, stannate of soda, sulphite of soda, and citric acid used in manufactures, photography, or philosophical research. James Burgess Readman, 175, Buchanan Street, Glasgow, manufacturing-chemist.



No. 13772, Cl. 1, Nov. 27th, 1877.—Chemical substances used in manufactures, photography, or philosophical research. George Atkinson, of and on behalf of the firm of George Atkinson and Co., 66, Aldersgate Street, London, manufacturing chemists.

UNIVERSAL PROVIDER

No. 14192, Cl. 1, Feb. 6th, 1878.—Artists' colours, photographic chemicals. William Whiteley, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, and 14A, Westbourne Grove, and 147, 149, 151, and 157, Queen's Road, Bayswater, Middlesex, universal provider.



No. 14193, Cl. 1, Feb. 6th, 1878.—Chemical substances used in manufactures, photography, or philosophical

research and anti-corrosives. HENRY BROOKS, on behalf of self and partners, Edward Gaynor Robinson, Samuel Luke, Octavius Charles Beale, and Robert Cochrane, trading as Henry Brooks & Co., at 70, Bishopsgate Street Within, London, and as Brooks, Robinson & Co., at Melbourne, Australia, merchants and exporters.



No. 14305, Cl. 1, Feb. 25th, 1878.—Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. OWEN SCRIPPS TUDOR, of and on behalf of the firm of Tudor, Moore & Co., 27, Leadenhall Street, London, merchants.



No. 14343, Cl. 1, March 1st, 1878.—Colours, pigments, powders, and other chemical substances used in manufactures, photography, or chemical research. JOHN MERRIMAN GIBSON, secretary of and on behalf of the Silicic Aluminate Paint Company, Limited, Buckley, Flintshire, paint manufacturers.



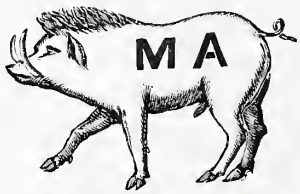
No. 14460, Cl. 1, Mar. 15th, 1878.—Chemical substances used in photography. ERNEST SCHERING, managing director of and on behalf of the Chemische Fabrik auf Actien, Berlin, manufacturers of chemicals.



No. 14461, Cl. 1, Mar. 15th, 1878.—Chemical substances used in photography. ERNEST SCHERING, managing director of and on behalf of the Chemische Fabrik auf Actien, Berlin, manufacturers of chemicals.



No. 14476, Cl. 1, March 20th, 1878.—Chemical substances used in manufactures, photography, or philosophical research. MARTIN JOSEPH MEENS, trading as M. & J. Meens, Antwerp, Belgium, sulphur manufacturer.



No. 14317, Cl. 1, April 1st, 1878.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. FRANCIS WILLIAM MACAN, 85, Gracechurch Street, London, merchant.



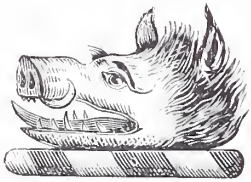
No. 14787, Cl. 8, May 22nd, 1878.—Pneumatic apparatus for photographic cameras. JAMES WILLIAM THOMAS CADETT, 68, Camberwell Grove, Surrey, mechanical engineer.



No. 14965, Cl. 1, June 27th, 1878.—Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. JOHN EBENEZER WATSON, secretary of and on behalf of the North British Chemical Company, Limited, 149, Hope Street, Glasgow; and White Crooke, Clydebank, Lanarkshire, Scotland, manufacturing chemists.



No. 15044, Cl. 1, July 26th, 1878.—Borax, borate of lime, soda, potash, or other borates, boracic acid, tineal, and all other combinations of boron, whether native or manufactured, and also used in photography, and preparations for uses in the arts and in the manufacture of grease for waggons, locomotives, and other purposes. JESSE ASCOUGH, Handsworth, Staffordshire, candle manufacturer and agent.



No. 15350, Cl. 1, Oct. 1st, 1878.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. WILLIAM DENNET EVANS, on behalf of self and partner, Hemington Cant, trading as Evans, Cant & Co., the Eastern Chemical Works, Marsh Gate Lane, Stratford, Essex, aniline dyes and chemical manufacturers.



No. 15521, Cl. 1, Oct. 16th, 1878.—Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. FERDINAND RÖSING, 11, Billiter Square, London, merchant.

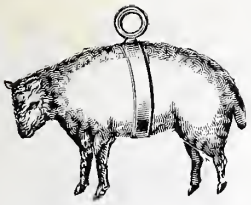


No. 15807, Cl. 1, Nov. 29th, 1878.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, namely, acids, alkalies, artists' colours, pigments, mineral dyes, varnish, and all other articles, included in the same class. EDWARD DETHICK SHAW, of and on behalf of the firm of John Shaw and Sons, Wolverhampton, Staffordshire, merchants.



No. 15864, Cl. 1, Feb. 6th, 1879.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. PHILIP JOHN WORSLEY, managing director of and on behalf of the Netham Chemical Company, Limited, Bristol, manufacturers of chemical substances.

No. 20391, Cl. 1, March 22nd, 1879.—Chemical substances used in manufactures, photography, or philosophical research (except paints). ROBERT COCHRANE, on behalf of self and partners, Henry Brooks and Edward Gaynor Robinson, trading as Henry



Brooks & Co., at 70, Bishopsgate Street Within, London; and as Brooks, Robinson, & Co., at Melbourne, Australia, merchants and exporters.



No. 20392, Cl. 1, March 22nd, 1879.—Chemical substances used in manufactures, photography, or philosophical research (except paints). ROBERT COCHRANE, on behalf of self and partners, Henry Brooks and Edward Gaynor Robinson, trading as Henry Brooks and Co., at 70, Bishopsgate Street Within, London; and as Brooks, Robinson and Co., at Melbourne, Australia, merchants and exporters.



No. 20395, Cl. 1, March 22nd, 1879.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives (except paint). ROBERT COCHRANE, on behalf of self and partners, Henry Brooks and Edward Gaynor Robinson, trading as Henry Brooks and Co., at 70, Bishopsgate, Street Within, London; and as Brooks, Robinson and Co., at Melbourne, Australia, merchants and exporters.

No. 21121, Cl. 1, Sept. 10th, 1879.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. WILLIAM COOPER WOODHAMS, trading as



Wallis and Co., 64, Long Acre, Westminster and Abbey Mills, West Ham, Essex, varnish and japan manufacturers.



No. 21544, Cl. 1, Nov. 20th, 1879.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. JAMES SCOTT, on behalf of self and partner, John Gordon Scott, trading as James and John G. Scott, 4, Dixon Street, Glasgow, Scotland, paint and colour manufacturers, oil merchants and refiners.



No. 21078, Cl. 1, Dec. 24th, 1879.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. FREDERICK MORRISON, secretary of and on behalf of the Grocers' Association, Limited, 13, Nicholas Lane, King William Street, London, grocers, chandlers, and general dealers.



No. 21766, Cl. 1, Jan. 12th, 1880.—Chemical substances used in manufactures photography, or philosophical

research, and anti-corrosives. JESSE ASCOUGH, Handsworth, Staffordshire, candle manufacturer and agent.



No. 21842, Cl. 1, Jan. 28th, 1880.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. JOSIAH CURRY, of and on behalf of the firm of Allen, Pearce and Company, 10 and 11, Bath Street, Bristol, druggists' sundryman.

COAGULINE

No. 21881, Cl. 1, Feb. 7th, 1880.—Chemical substances used in manufactures, photography, or philosophical research. THOMAS KAY, on behalf of self and partner, Samuel Kay, trading as Kay Brothers, 7 and 9, Lower Hillgate, Stockport, Cheshire, chemists.



No. 22230, Cl. 1, April 7th, 1880.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. RICHARD COBDEN COX, manager of and on behalf of the company, trading as the Sussex Co-operative Drug Company, 138, Queen's Road, Brighton, Sussex, wholesale druggists.



No. 22335, Cl. 1, April 29th, 1880.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. MAX NEUSTADT, trading as M. Neustadt and Co, 25, Mincing Lane, London, drug, chemical, and albumenised paper merchant.



No. 22336, Cl. 1, April 29th, 1880.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. MAX NEUSTADT, trading as M. Neustadt and Co., 25, Mincing Lane, London, drug, chemical and albumenised paper merchant.

No. 22562, Cl. 1, June 18th, 1880.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. MAX



NEUSTADT, trading as M. Neustadt and Co., 25, Mincing Lane, London, drug, chemical, and albumenised paper merchant.

No. 22414, Cl. 15, May 20th, 1880.—Photographic dry plates of glass. FRANK BISHOP, on behalf of self and partners, Léon Marion, Henry Géry,

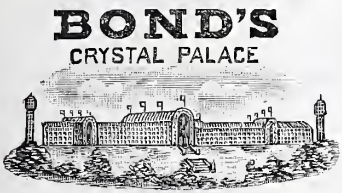


George Bishop and John Pattison Kirk, trading as Marion and Co., 22 and 23, Soho Square, Middlesex, wholesale

stationers and photographic publishers and dealers.



No. 22961, Cl. 1, Sept. 21st, 1880.—Chemical substances used in manufactures and photography. JOHN DAVID HUMPHREYS, trading as A. S. Watson and Co., 106, Fenchurch Street, London; and at Hong Kong Dispensary, Hong Kong; and Canton Dispensary, Canton; Shangai Pharmacy, Shangai; Treaty Ports, China; and also the Philippine Island, Japan, the Straits Settlements, Cochin China, Siam, and elsewhere, wholesale and export chemist and druggist, perfumer, aërated water manufacturer, and wine merchant.



No. 25166, Cl. 1, Nov. 8th, 1880.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. JAMES HICKISSON, trading as John Bond, 75, Southgate Road, Middlesex, marking ink manufacturer.



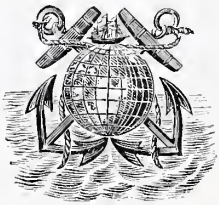
No. 25672, Cl. 1, Feb. 10th, 1881.—Chemical substances used in manufactures and photography, anti-corrosives and anti-fouling compositions. ROBERT MASON SUMNER, of and on behalf of the firm of R. Sumner & Co., 50A, Lord Street, Liverpool, wholesale druggists.



No. 25950, Cl. 1, April 1st, 1881.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. GEORGE EDWARD PRITCHETT, 20, Spring Gardens, London, architect and sanitary engineer.



No. 25357, Cl. 1, April 14th, 1881.—Chemical substances used in manufactures, photography, and philosophical research. JOHN JAMES EVANS, of and on behalf of the firm trading as Evans, Sons & Co., at 56, Hanover Street, Liverpool; and as Evans, Lescher and Webb, at Bartholomew Close, London, wholesale druggists.



No. 26125, Cl. 1, May 11th, 1881.—Chemical substances used in manufactures, photography or philosophica research, and anti-corrosives. GEORGE DIXON WEBSTER, Great Union Street, Hull, Yorkshire, lead, paint, colour and varnish manufacturer.

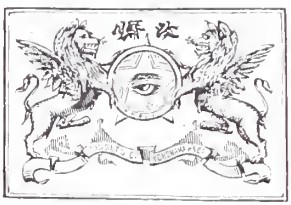


25904, Cl. 1, May 12th, 1881.—Chemical substances used in manufactures, photography or philosophical

research, and anti-corrosives. SAMUEL YORK, trading as Samuel York and Co., Snow Hill, Wolverhampton, Staffordshire, merchants.



No. 26328, Cl. 1, June 17th, 1881.—Chemical substances used in manufactures, photography, philosophical research, or anti-corrosives and anti-foulers. THOMAS JAMES BARRATT, partner of and on behalf of the firm of A. & F. Pears, 38 and 39, Great Russell Street, Bloomsbury, London; and Isleworth, Middlesex, soap and perfume manufacturers.



No. 26651, Cl. 1, Aug. 24th, 1881.—Chemical substances used in manufactures and in photography, anti-corrosives and anti-foulers. JAMES BISSET, of Yokobama, Japan, now residing at 50, Finsbury Square, London, merchant.



No. 26839, Cl. 1, Sept. 30th, 1881.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. ROBERT PRINGLE, trading as Robert Pringle and Co., Wilderness Works, 42, Clerkenwell Road, Middlesex, wholesale jeweller.



No. 26900, Cl. 1, Oct. 10th, 1881.—Chemical substances used in manufactures, photography and philosophical research, namely, acids (including vegetable acids), alkalies, pigments, mineral dyes, and varnish. HENRY OXENFORD PRESTON, Asbburton Villa, Thornton Heath, Surrey; and 4, Cullum Street, London, chemical agent.



No. 26457, Cl. 1, Oct. 27th, 1881.—Chemical substances used in photography.—STANLEY SPOONER, Tavistock Chambers, Covent Garden, Middlesex, accountant.



No. 26650, Cl. 1, Nov. 10th, 1881.—Chemical substances used in manufactures and in photography, anti-corrosives and anti-foulers. JAMES BISSET, of Yokohama, Japan, now residing at 50, Finsbury Square, London, merchant.

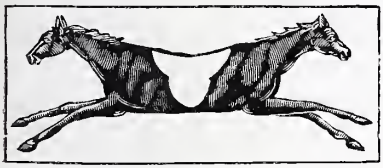


No. 27157, Cl. 1, Nov. 30th, 1881.—Chemical substances used in manufactures, photography, or philosophical

research, anti-corrosives and anti-foulers. Albert Kampe, secretary of and on behalf of the United Agencies, Ltd., Jeffrey Square, St. Mary Axe, London, merchants and agents.



No. 27483, Cl. 1, Jan. 19th, 1882.—Chemical substances used in manufactures and photography. Samuel Cocking, the younger, trading as Cocking & Co., 75, Yokohama, Japan, merchant.



No. 27638, Cl. 1, Feb. 14th, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers. Oscar Mœnich, trading as Oscar Mœnich & Co., 8, Coleman Street, London, merchant.



No. 27742, Cl. 1, Feb. 28th, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers, including caustic soda. Christian Rudolph Fernando Thiedemann, of and on behalf of the firm of R. Thiedemann & Co., 3, Lombard Street, Newcastle-on-Tyne, Northumberland, merchants.

No. 27847, Cl. 1, Mar. 13th, 1882.—Chemical substances used in manufactures, photography, or philosophical



research, anti-corrosives and anti-foulers. Gustav Adolph Köttgen, of and on behalf of the firm of John Batt and Co., 39, Old Broad Street, London, merchants.



No. 27848, Cl. 1, March 13th, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers. Gustav Adolph Köttgen, of and on behalf of the firm of John Batt and Co , 39, Old Broad Street, London, merchants.



No. 27849, Cl. 1, March 13th, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers. Gustav Adolph Köttgen, of and on behalf of the firm of John Batt and Co., 39, Old Broad Street, London, merchants.



No. 27852, Cl. 1, March 13th, 1882.—Chemical substances used in manufactures, photography, or philosophical reasearch, anti-corrosives and anti-foulers. Gustav Adolph Köttgen, of

and on behalf of the firm of John Batt and Co., 39, Old Broad Street, London, merchants.



No. 27983, Cl. 1, Mar. 27th, 1882.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. THOMAS WALKER, Merton Bank Alkali Works, St. Helen's, Lancashire, alkali manufacturer.



No. 28148, Cl. 1, April 17th, 1882.—Chemical substances used in manufactures, and photography, anti-corrosives and anti-foulers. FREDERICK HARGRAVE GREY, trading as Grey and Marten, Southwark Bridge, Southwark, Surrey, lead manufacturers, and zinc, glass, and colour merchants.



No. 28291, Cl. 1, May 12th, 1882.—Every description of goods included within Class 1. MAX LANDAU, late of Dashwood House, New Broad Street, trading as Max Landau & Co., at 9, Mincing Lane, London, East India merchant.



No. 28335, Cl. 1, May 19th, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers included in Class 1. HERMANN DIETZE, managing director of and on behalf of the Verein für Chemische Industrie, Frankfort-on-the-Main, Germany, chemical manufacturers.



No. 28538, Cl. 1, June 21st, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers. ROBERT MEGGITT, managing director of and on behalf of the firm of Blundell, Spence & Company, Limited, Hull, Yorkshire, and London, paint, colour, oil, and varnish manufacturers.



No. 28539, Cl. 1, June 21st, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives, and anti-foulers. ROBERT MEGGITT, managing director of and on behalf of the firm of Blundell, Spense & Company, Limited, Hull, Yorkshire, and London, paint, colour, oil, and varnish manufacturers.



No. 28540, Cl. 1, June 21st, 1882.—Chemical substances used in manufactures, photography, or philosophical

research, anti-corrosives, and anti-foulers. ROBERT MEGGITT, managing director of and on behalf of the firm of Blundell, Spence & Company, Limited, Hull, Yorkshire, and London, paint, colour, oil, and varnish manufacturers.



No. 28576, Cl. 1, June 28th, 1882.—All descriptions of acids, pigments, mineral dyes, and other chemical substances used in manufactures, and photography, also anti-corrosives, and anti-foulers, and artists' colours. AUGUST CHRISTOPH CORDES, trading as August C. Cordes, Hamburg, Germany, merchant.



No. 28665, Cl. 1, July 8th, 1882.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers. WILLIAM HENRY HARTON, the younger, of and on behalf of the firm of Gilman & Co., Hong Kong, China, merchants.



No. 29201, Cl. 1, Sept. 28th, 1882.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. ROBERT STIRLING NEWALL, Washington Chemical Works, Durham, chemical manufacturer.



No. 29567, Cl. 1, November 1st, 1882.—Chemical substances used in manufactures, photography, and philosophical research, and anti-corrosives. LEONARD CHARLES STAGG, of and on behalf of the firm of L. C. Stagg & Co., Guayaquil, Ecuador, South America, merchants.



No. 29772, Cl. 1, Nov. 22nd, 1882.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. HUGH BROWN MUIR, trading as H. B. Muir & Co., 26, Old Broad Street, London, merchant.



No. 29965, Cl. 8, Dec. 13th, 1882.—All kinds of optical goods and scientific and philosophical instruments, all being included in Class 8. JEAN BAPTISTE JACQUEMIN, of and on behalf of the firm of J. B. Jacquemin Bros., 42, Hatton Garden, Middlesex, wholesale opticians.



No. 31104, Cl. 1, Jan. 2nd, 1883.—All goods mentioned in Class 1. WILLIAM GEORGE HILLS, of and on behalf of the firm of Hills, Menke and Co., 8, Great Charles Street, Birmingham, export merchants.



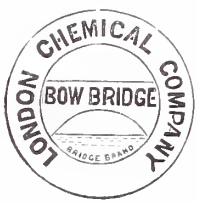
No. 31104, Cl. 15, Jan. 2nd, 1883.—All goods mentioned in Class 15. William George Hills, of and on behalf of the firm of Hills, Menke and Co., 8, Great Charles Street, Birmingham, export merchants.



No. 31145, Cl. 15, Jan. 10th, 1883.—All descriptions of glass and glass ware included in Class 15, including glass beads. Graham King, manager of and on behalf of John Michelburgh Dunbar and Lancton Brown, trading as Lancton Brown & Co., at 11, Silver Street, Wood Street, London, East India merchants; and as Gardner, Brown & Co., at Rangoon, British Burmah merchants.



No. 29898, Cl. 1, Jan. 16th, 1883.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. Frederick Keep, on and on behalf of the firm of Keep Bros., 11, Broad Street, Birmingham, merchants.



No. 31198 Cl. 1, Jan. 17th, 1883.—Acids, alkalies, salts, and chemical substances, crude or prepared, used in manufactures, photography, and philosophical research; compositions for preventing corrosion, incrustation and radiation; paints, varnishes, pigments, mineral dyes, mordants, wood stains, lacquers and japans. Edward John Ellis, trading as the London Chemical Company, Bow Bridge Wharf, Essex, chemical manufacturer.



No. 31219, Cl. 1, Jan. 22nd, 1883.—Chemical substances, crude or prepared, photography, or philosophical research. Henry Ahrens, trading as H. Ahrens & Co., 17, Leadenhall Street, London, merchant and shipper.



No. 31367, Cl. 1, Feb. 8th, 1883.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers, including caustic soda. Max Walchter, of and on behalf of the firm of Bessler, Walchter and Co., Royal Bank Buildings, 123, Bishopsgate Street Within, London, merchants.



No. 31473, Cl. 1, Feb. 20th, 1883.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives, or anti-foulers, including caustic soda. Wm. Oppenheimer, of and on behalf of the firm of Oppenheimer Bros. & Co., 32, Monkwell Street, London, export merchants.

No. 31560, Cl. 1, March 1st, 1883.—Glue and chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. Bernard Cannon, on behalf of self and partners,



trading at Lincoln as B. Cannon and Co., and at Dublin as E. Cannon and Sons, leather dressers and glue manufacturers.



No. 31561, Cl. 1, Mar. 1st, 1883.—Glue and chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. Bernard Cannon, on behalf of self and partners, trading at Lincoln as B. Cannon & Co., and at Dublin as E. Cannon & Sons, leather dressers and glue manufacturers.



No. 31846, Cl. 1, March 24th, 1883.—Chemical substances used in manufactures, photography and philosophical research, namely, chloride of gold, nitrate of silver, cyanide of potassium, mineral and vegetable acids, alkalies, artists' colours, pigments, mineral dyes, and varnishes. John Grove Johnson, managing director of and on behalf of the firm of Johnson & Sons, Limited, 23, Cross Street, Finsbury, Middlesex, manufacturing chemists.



No. 31909, Cl. 1, April 3rd, 1883.—Chemicals for causing photographs to adhere to glass, and rendering them permanent after being painted. Lizzie Goggs, trading as the Crysoleum Company, 500, Oxford Street West, London, dealer and instructress in fine arts.



No. 32081, Cl. 1, April 19th, 1883.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Ivan Levinstein, trading as I. Levinstein and Co., Manchester, Lancashire, aniline dye manufacturer.



No. 32194, Cl. 1, April 27th, 1883.—Chemical substances used in manufactures, photography, and philosophical research, anti-corrosives and anti-foulers. Hartmann Bros., 18, Billiter Street, London, and Canning Town Works, Canning Town, Essex, merchants and manufacturers.



No. 33158, Cl. 1, Aug. 4th, 1883.—Chemical substances used in the manufactures, photography, or philosophical research, namely, sulphate of magnesia, sulphate of lime, alum, and chloride of zinc. Winser & Co., Princess Street, Manchester, manufacturing chemists.

No. 33216, Cl. 1, Aug. 10th, 1883.—Chemical substances used in manufactures and photography, anti-corrosives



and anti-foulers. WILLIAM ALFRED SPARROW, 2, Jeffry's Square, St. Mary Axe, London, E.C , merchant.



No. 33217, Cl. 1, Aug. 10th, 1883.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. WILLIAM ALFRED SPARROW, 2, Jeffry's Square, St. Mary Axe, London, E.C , merchant.



No. 34510, Cl. 1, Dec. 5th, 1883.—Chemical substances used in manufactures, photography and philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 34513, Cl. 1, Dec. 5th, 1883.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 34514, Cl. 1, Dec. 15th, 1883.—Chemical substances used in manufactures, photography, or philosophic research. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 34515, Cl. 1, Dec. 5th, 1883.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 34516, Cl. 1, Dec. 5th, 1883.—Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 34518, Cl. 1, Dec. 5th, 1883.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.

ELECTRO-PHOTYPY

A CENTURY A-HEAD.

ELECTROTYPING THE NEGATIVE ITSELF.



Letterpress Copper Block, produced by

SUTTON'S PROCESS SYNDICATE, LTD

4, TOKENHOUSE BUILDINGS, LONDON, E.C.

Paper and Press says of this remarkable invention: "To assert that Mr. Sutton's process is practically valuable is unnecessary. To produce an electro direct from the negative is indeed an advance—one that would have been considered the *Ultima Thule* of past Investigators."



No. 34518, Cl. 1, Dec. 5th, 1883.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 34519, Cl. 1, Dec. 5th, 1883.—Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.

ALEXINOTON.

No. 35027, Cl. 1, Jan. 16th, 1884.—Chemical substances used in manufactures, photography or philosophical research, anti-corrosives and anti-foulers. THE BROXBURN OIL COMPANY, 28, Royal Exchange Square, Glasgow, Lanarkshire, oil distillers and merchants.



No. 27466, Cl. 15, Jan. 17th, 1844.—All descriptions of glass goods, including scent and other bottles, glass beads containing or covering photographic pictures, candlesticks, lamp chimneys, vases, Madonas or Madonnas, and other emblematical figures, cigar tubes and pipes, fish glasses, coffee, tea, wine and toilet services, or sets, or pieces, and other glassware of all kinds not included in any other classes. CHARLES JAMES LEO MEYERSTEIN, of and on behalf of the firm of William Meyerstein & Co., 6, Love Lane, Aldermanbury, London, merchants.

ANTI-CALCAIRE.

No. 35082, Cl. 1, Jan. 19th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. PROSPER AUGUSTE MAIGNEN, 22 and 23, Great Tower Street, London, E.C., filter merchant.



No. 35109, Cl. 1, Jan. 22nd, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. A. S. WATSON & Co., 106, Fenchurch Street, London, E C., merchants.

The Hong Kong Dispensary

No. 35114, Cl. 1, Jan. 22nd, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. A. S. WATSON & Co., 106. Fenchurch Street, London, E.C., merchants.

The Shanghai Pharmacy

No. 35119, Cl. 1, Jan. 22nd, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. A. S. WATSON & Co., 106, Fenchurch Street, London, E.C., merchants.



No. 35440, Cl. 1, Feb. 7th, 1884.—Chemical substances used in manufactures, photography, or philosophical

research, anti-corrosives and anti-foulers. May & Baker, Garden Wharf, Church Road, Battersea, Surrey, manufacturing chemists.



No. 35476, Cl. 1, Feb. 11th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Volkart Brothers, Winterthur, Switzerland, merchants.



No. 35484, Cl. 1, Feb. 11th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Volkart Brothers, Winterthur, Switzerland, merchants.



No. 35496, Cl. 1, Feb. 11th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Volkart Brothers, Winterthur, Switzerland, merchants.

No. 35717, Cl. 1, Feb. 22nd, 1884.—Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. Samuel Ward & Co., 32, Great Guildford



Street, Southwark, London, S.E., white lead, oil, petroleum and colour merchants.

LEMNOS

No. 36274, Cl 15, March 20th, 1884.—Window and plate glass, painted glass, glass mosaic, glass for optical purposes, glass ware. Harry John Skelton, 12, Lime Street, London, merchant.



No. 36860, Cl. 1, April 9th, 1884.—Chemical substances, including dye stuffs, being mineral dyes, used in manufactures, photography, and research, including anti-corrosives. Guinon, Picard & Jay, St. Fons (Rhone), France, manufacturers of dye stuffs and chemical products.



No. 37039, Cl. 1, April 23rd, 1884.—Chemical substances used in manufactures, photography, or philosophical research, namely, acids, including vegetable acids, alkalies, artists' colours, pigments, mineral dyes, varnish. Charles Lowe & Co., 43, Piccadilly, Manchester, and Reddish, near Stockport, manufacturing chemists.

THE "POCKET"

No. 37098, Cl. 8, April 25th, 1884.—Photographic apparatus. George Duncan Macdougald, Dundee, Forfarshire, N B, chemist.



No. 37278, Cl. 1, May 6th, 1884.—Chemical substances used in manufacture, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 37897, Cl. 1, June 6th, 1884.—Mordants for use in dyeing; lactic acid and the lactates, being chemical substances for use in manufactures, photography, and philosophical research. THOMAS SHEPHARD NOWELL, Boston, Massachusetts, United States of America, manufacturer.



No. 39935, Cl. 15, Sept. 30th, 1884.—Photographic dry plates. THE DERBY PHOTOGRAPHIC DRY PLATE COMPANY, LIMITED, 6, St. James Street, and 59A, Curzon Street, Derby, photographic apparatus manufacturers.



No. 40135, Cl. 1, Oct. 9th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 40136, Cl. 1, Oct. 9th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 40137, Cl. 1, Oct. 9th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.

THYMO-CARBOL

F. C. Calvert & Co.

No. 40184, Class 1, Oct. 13th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, namely, acids, including vegetable acids, alkalies, artists' colours, pigments, mineral dyes, varnish. FREDERICK CRACE CALVERT & COMPANY, Bradford, near Manchester, manufacturing chemists.

THYMO-PHENOL

F. C. Calvert & Co.

No. 40187, Cl. 1, Oct. 13th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, namely, acids, including vegetable acids, alkalies, artists' colours, pigments, mineral dyes, varnish FREDERICK CRACE CALVERT & COMPANY, Bradford, near Manchester, manufacturing chemists.



No. 40257, Cl. 1, Oct. 16th, 1884.—Chemical substances used in manufactures, photography, or philosophical research. Fairbridge, Holliday, & Co., 57, King Street, Manchester, merchants.

THYMO-CARBOL

F C Calvert & Co

No. 40184, Cl. 1, Nov. 17th, 1884.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, namely, acids, including vegetable acids, alkalies, artists' colours, pigments, mineral dyes, varnish. Frederick Crace Calvert and Co., Bradford near Manchester, manufacturing chemists.

THE CHARTERHOUSE.

No. 41000 Cl. 15, Nov. 20th, 1884.—Photographic glass. The Photographic Artists' Co-operative Supply Association, Limited, also trading as the Photographic Artists' Stores, 43, Charterhouse Square, London, E.C., manufacturers of photographic materials and apparatus.



No. 41280, Cl. 1, Dec. 4th, 1884.—Graiued dry plates for use in photography. Brunner & Kunkler, 33, Klybeck Strasse, Bâle, Switzerland, manufacturers of photographic plates.

THE "INVICTA"

No. 41703, Cl. 1, Dec. 22nd, 1884.—All chemicals and chemical preparations (within Class 1) used in photography, including photographic dry plates. John William Jones, Palmerston Buildings, 138 and 139, Old Broad Street, London, E.C., merchant and manufacturer.

THE CHARTERHOUSE

No. 42545, Cl. 1, Feb. 2nd, 1885.—Chemical substances used in photography. The Photographic Artists' Co-operative Supply Association, Limited, also trading as the Photographic Artists' Stores, 43, Charterhouse Square, London, E.C., manufacturers and dealers in photographic apparatus and materials.

"THE INVICTA."

No. 42550, Cl. 15, Feb. 2nd, 1885.—Glass used in connection with photography. The Photographic Artists' Co-operative Supply Association, Ltd., also trading as the Photographic Artists' Stores, 43, Charterhouse Square, London, E.C., manufacturers and dealers in photographic apparatus and materials.

"THE URANIUM."

No. 42551, Cl. 15, Feb. 2nd, 1885.—Glass used in connection with photography. The Photographic Artists' Co-operative Supply Association, Ltd., also trading as the Photographic Artists' Stores, 43, Charterhouse Square, London, E.C., manufacturers and dealers in photographic apparatus and materials.

"ALLIANCE"

Gelatine 

Dry Plates

No. 42718, Cl. 1, Feb. 9th, 1885.—Photographic dry plates. Leather, Sadler & Holmes, 24, Southall Street, Strangeways, Manchester, glass merchants, and dealers in photographic materials.



No. 42887, Cl. 1, Feb. 14th, 1885.—Sulphate of copper used in manufactures, photography, or philosophical research, and all other articles included in Class 1 Duncan McKecknie, St. Helens, Lancashire, metal extractor.

BOVAL

No. 42916, Cl. 8, Feb. 17th, 1885.—Chemical and photographic apparatus, philosophical instruments, and all other articles in Class 8. JAMES WOOLLEY, SONS & Co., 69, Market Street, Manchester, manufacturing chemists.

BOVAL

No. 42919, Cl. 15, Feb. 17th, 1885.—Glass stoppers, glass bottles, and all other articles in Class 15. JAMES WOOLLEY, SONS & Co., 69, Market St., Manchester, manufacturing chemists.



No. 43240, Cl. 1, Mar. 2nd, 1885.—Photographic chemicals (including films) and photographic dry plates. JOHN WILLIAM HUNTER, Albert Place, Stockton-on-Tees, Durham, wholesale druggist.



No. 43255, Cl. 1, March 2nd, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including glue. MIDDLETON, KIRKPATRICK & BARR, 4, Cullum Street, London, E.C., and Newcastle-on-Tyne, chemical merchants.



No. 43463, Cl. 1, March 10th, 1885.—Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. THEODOR LANGGAARD, 20, Fenchurch Street, London, E.C., merchant.



No. 43467, Cl. 1, March 10th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. THEODOR LANGGAARD, 20, Fenchurch Street, London, E C., merchant.



No. 43471, Cl. 1, March 10th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. THEODOR LANGGAARD, 20, Fenchurch Street, London, E.C., merchant.



No. 43475, Cl. 1, March 10th, 1885.—Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. THEODOR LANGGAARD, 20, Fenchurch Street, London, E.C., merchant.



No. 43743, Cl. 1, Mar. 19th, 1885.—Chemical substances used in manufactures, photography, or philosophical

research, and anti-corrosives. Oscar Moenich, trading as Oscar Moenich and Co., 8, Coleman Street, London, merchant.



No. 44233, Cl. 1, April 4th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Thomas Hubbuck & Son, 24, Lime Street, London, paint and oil manufacturers.

THE SAILOR BRAND.

No. 44236, Cl. 1, April 4th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Thomas Hubbuck and Son, 24, Lime Street, London, paint and oil manufacturers.

THE MARINER BRAND.

No. 44239, Cl. 1, April 4th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Thomas Hubbuck and Son, 24, Lime Street, London, paint and oil manufacturers.

CASTLE BRAND

No. 44684, Cl. 1, April 29th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including mineral dyes. Samuel Day Wills, trading as Samuel Wills & Co., Castle Green Colour Works, and Avonside Varnish Works, Bristol, colour and varnish manufacturer.

ALBION.

No. 44685, Cl. 1, April 29th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Samuel Day Wills, trading as Samuel Wills and Co., Castle Green Colour Works and Avonside Varnish Works, Bristol, colour and varnish manufacturer.



No. 44701, Cl. 1.—Chemical substances used in manufactures, photography, or philosophical research, not including composition for removing boiler incrustation and composition used in sizing cotton warps. United Agencies, Limited, Jeffrey Square, London, merchants.



No. 44722, Cl. 8, April 30th, 1885.—Philosophical and scientific instruments and appliances for teaching purposes, namely, astronomical and mathematical instruments, logs, thermometers and barometers, photographic cameras, electrical and pneumatic appliances included in Class 8, and spectacles, opera glasses, and the like goods included in Class 8. William Jas. Lancaster, trading as J. Lancaster and Son, Colmore Row, Birmingham, optician.



No. 45056, Cl. 1, May 13th, 1885.—Gelatino-bromic silver emulsions, dry or liquid, either alone or applied upon glass, paper, cloth, parchment, etc. For photographic purposes, photographic dry plates. Hortense Van Monckhoven, 117, Rue de l'Hôpital, Ghent, Belgium, manufacturer.

HUBBUCK

No. 45330, Cl. 1, May 26th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. THOMAS HUBBUCK & SON, 24, Lime Street, London, paint and oil manufacturers.



No. 45576, Cl. 1, June 9th, 1885.—All descriptions of acids, alkalies, colours, pigments, aniline and other mineral dyes included in Class 1. W. MEYENSTEIN & Co., 6, Love Lane, Aldermanbury, London, merchants.



No. 45577, Cl. 1, June 9th, 1885.—All descriptions of acids, alkalies, colours, pigments, aniline, and other mineral dyes included in Class 1. W. MEYENSTEIN & Co., 6, Love Lane, Aldermanbury, London, merchants.



No. 46647, Cl. 1, Aug. 4th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. ALFRED LIEBERT, Hamburg, Germany, merchant.



No. 47351, Cl. 1, Sept. 12th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. The CO-OPERATIVE WHOLESALE SOCIETY, LIMITED, 1, Balloon Street, Manchester, wholesale grocers, drapers, and general dealers.

HOLMES' PHOTOGRAPHIC OZONE.

No. 47428, Cl. 1, Sept. 15th, 1885.—Chemical substances used in photography. JOSEPH ROBERT HOLMES, trading as Holmes' Ozone Company, also as Joseph R. Holmes & Co., 12, Waterloo Street, Glasgow, electrician, engineer, and agent.



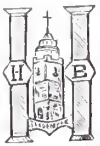
No. 47438, Cl. 1, Sept. 15th, 1885.—Chemical substances used in manufacture, photography, and philosophical research, not including lacquers, anti-corrosives, and all other goods of the nature of paint, colours, pigments, ochres, bronzing compositions, varnishers, and dryers. DAVID STORER AND SONS, 5 and 6, Billiter Avenue, London, E.C., oil merchants.

ARISTOTYPE

No. 47512, Cl. 1, Sept. 18th, 1885.—Chemical preparations for use in photography. Dr. EDWARD LIESEGANG, Dusseldorf, Germany, dealer in photographic materials.



No. 47556, Cl. 1, Sept. 21st, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. VOLKART BROTHERS, Winterthur, Switzerland, merchants.



No. 47890, Cl. 1, Oct. 7th, 1885.—Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. Harrington Bros., Shandon Chemical Works, Common Road, Cork, chemical manufacturers.



No. 48032, Cl. 1, Oct. 13th, 1885.—Photographic dry plates. Frederick Charles Luther Wratten, trading as Wratten & Wainwright, 38, Queen Victoria Street, London, E.C., photographic chemists.

UNICORN BRAND

No. 48690, Cl. 1, Nov. 9th, 1885.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including soda. John Foulger & Sons, 6, Lime Street, London, oil and colour merchants and manufacturers.



No. 49045, Cl. 1, Nov. 21st, 1885.—Photographic chemicals, varnish and opals, also dry plates. Samuel Fry and Company, Limited, 2, Devonshire Chambers, Bishopsgate Street Without, London, E.C., photographic dry plate manufacturers.

OPTIMUS

No. 49452, Cl. 8, Dec. 9th, 1885.—Philosophical, scientific and educational instruments and appliances, including photographic apparatus, microscopes, telescopes, barometers, thermometers, gauges and opera glasses. Lejeune & Perken, 101 and 24, Hatton Garden, Middlesex, merchants.



No. 49684, Cl. 1, Dec. 18th, 1885.—Chemical substances used in manufactures, photography or philosophical research, not including anti-corrosives. Wells and Richardson Company, 58, Shoe Lane, London, wholesale druggists.

DIAMOND

No. 49688, Cl. 1, Dec. 18th, 1885.—Chemical substances used in manufactures, photography or philosophical research not including anti-corrosives. Wells and Richardson Company, 58, Shoe Lane, London, wholesale druggists.

ALBERT
PHOTOGRAPHIC DRY PLATES

No. 50034, Cl. 1, Jan. 5th, 1886.—Photographic dry plates. John Allen Sykes, Lindley, Huddersfield, Yorkshire, analytical chemist.

FALCON BRAND

No. 51275, Cl. 1, Feb. 22nd, 1886.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers, including varnishes of all kinds, dry colours, colours ground in oil, turpentine, or water; colours ready mixed for use, dry white lead, and white lead ground in oil; dry zinc oxide, and zinc oxide ground in oil. Wilkinson, Heywood & Clark, 7, Caledonian Road, King's Cross, London, varnish, japan, colours and paint manufacturers.



No. 51303, Cl. 1, Feb. 22nd, 1886—Photographic dry plates. Alfred Harman, trading as the Britannia Works Company, Britannia Works, Ilford, Essex, manufacturer of dry plates.



No. 51304, Cl. 1, Feb. 22nd, 1886.—Photographic dry plates. ALFRED HARMAN, trading as the Britannia Works Company, Britannia Works, Ilford, Essex, manufacturer of dry plates.



No. 51612, Cl. 1, March 3rd, 1886.—Photographic dry plates. MARION & Co., 22 and 23, Soho Square, London, W., dealers in photographic materials.



No. 51980, Cl. 1, March 13th, 1886.—Photographic dry plates. MARION AND Co., 22 and 23, Soho Square, London, W., dealers in photographic materials.

KOMPO

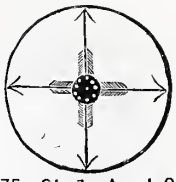
J. F. White

SOLE PROPRIETORS AND MANUFACTURERS

No. 48772, Cl. 1, Mar 27th, 1886.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. The firm trading as J. F. WHITE, Benson Street, Leeds, manufacturing chemists.



No. 51174, Cl. 1, Mar. 30th, 1886.—Photographic dry plates. MARION & Co., 22 and 23, Soho Square, London, W., dealers in photographic materials.



No. 52575, Cl. 1, April 2nd, 1886.—All chemical substances included in Class 1 which are used in manufactures, photography, or philosophical research, and anti-corrosives. F. C. CALVERT & Co, Bradford, near Manchester, manufacturing chemists.

PERFECTION

Hayman & Co

SOLE PROPRIETORS

No. 52891, Cl. 1, April 10th, 1886.—Photographic dry plates. HAYMAN AND Co, 3, Coleman Street, London, Middlesex, merchants.



No. 53587, Cl. 8, May 8th, 1886.—Philosophical, mathematical, and scientific instruments. JOSEPH HAMMERSLEY, 41, Half Moon Crescent, Islington, Middlesex. Telescope, microscope, and mathematical instrument maker.



No. 54984, Cl. 1, June 30th, 1886.—Chemical articles of any kind included in Class 1. KUNHEIM & Co., 23, Linden Strasse, Berlin, Germany, manufacturers.

F. C. Calvert & Co

No. 56721, Cl. 1, Sept. 14th, 1886.—All chemical substances included in Class 1, which are used in manufactures, photography, or philosophical re-

search, and anti-corrosives. F. C. Calvert and Co., Bradford, near Manchester, mannfacturing chemists.



No. 56813, Cl. 1, Sept. 16th, 1886.—Chemical substances nsed in manufactures, photography, or philosophical research. Emanuel Merck, Darmstadt, Germany, mannfacturing chemists.



No. 57622, Cl. 1, Oct. 12th, 1886.—Photographic dry plates, photographic gelatine chloride plates, and photographic opal plates. Stanley Spooner, trading as the Sun Albumenising and Manufactnring Company, 4, Iffley Road, Hammersmith, London, acconntaut.



No. 58040, Cl. 1, Oct. 25th, 1886.—A chemical substance used in mannfactures, photography and philosophical research. Jesse Ascough, Handsworth, Birmingham, agent.



No. 56726, Cl. 1, Oct. 29th, 1886.—All chemical substances included in Class 1 which are used in manufactures, photography, or philosophical research, and anti-corrosives. F. C. Calvert & Co., Bradford, near Manchester, manufacturing chemists.

TATTOO

No. 58323, Cl. 1, Oct. 29th, 1886.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. David Storer and Sons, 5 & 6, Billiter Avenue, London, E.C., and Sydney Street, Glasgow, merchants.

NATIONAL

No. 58616, Cl. 1, Nov. 5th, 1886.—Chemical snbstances used in manufactures, photography and philosophical research, anti-corrosives and anti-foulers, paints, varnishes and pigments. M. Holzapfel & Co., Newcastle-upon-Tyne, mannfacturers and general merchants.

NAZIONALE

No. 58617, Cl. 1, Nov. 5th, 1886.—Chemical snbstances used in mannfactures, photography and philosophical research, anti-corrosives and anti-foulers, paints, varnishes, and pigments. M. Holzapfel & Co., Newcastle-upon-Tyne, manufactnrers and general merchants.

NACIONALE

No. 58618, Cl. 1, Nov. 5th, 1886.—Chemical substances used in manufactnres, photography, and philosophical research; anti-corrosives and anti-foulers; paints, varnishes, and pigments. M. Holzapfel & Co., Newcastle-upon-Tyne, mannfactnrers and general merchants.

NATIONALE

No. 58649, Cl. 1, Nov. 6th, 1886.—Chemical snbstances used in manufactures, photography and philosophical research, anti-corrosives, anti-foulers, paints, varnishes, and pigments. M. Holzapfel & Co., Newcastle-upon-Tyne, manufacturers and general merchants.

CAMPANA

No. 58679, Cl. 1, Nov. 8th, 1886.—Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. DAVID STORER AND SONS, 5 and 6, Billiter Avenue, London, E.C., and Sydney Street, Glasgow, paint, colour, varnish and oil manufacturers, and general merchants.



No. 58972, Cl. 1, Nov. 16th, 1886.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers. MAY & BAKER, Garden Wharf, Church Road, Battersea, Surrey, manufacturing chemists.

HARVIE'S LENSES

No. 57954, Cl. 15, Nov. 27th, 1886.—Lenses. WILLIAM HARVIE, 222, Broomielaw, Glasgow, Lanarkshire, North Britain, lamp manufacturer.



No. 61189, Cl. 1, Jan. 20th, 1887.—Photographic chemicals and varnish. ROBERT TAVENER WALL, Acacia Villa, Longfleet, Poole, Dorsetshire, photographer.



No. 61303, Cl. 8, Jan. 24th, 1887.—Photographic apparatus. GEORGE SALLNOW MARTIN, Birkbeck Institution, Bream's Buildings, Chancery Lane, optician.

GLOW WORM

No. 61343, Cl. 15, Jan. 25th, 1887.—All descriptions of glass ware included in Class 15. THOMAS FERDINAND WALKER and LEWIS JOHN MURRAY, trading as John Walsh Walsh, Soho and Vesta Glass Works, Lodge Road, Birmingham, Warwickshire, glass manufacturers.



No. 61697, Cl. 1, Feb. 2nd, 1887.—Gelatino-bromide dry plates, gelatino-chloride dry plates. MAWSON AND SWAN, Mosley Street, Newcastle-on-Tyne, chemists and scientific instrument makers.

THE CASTLE.

No. 61698, Cl. 1, Feb. 2nd, 1887.—Gelatino-bromide dry plates, gelatino-chloride dry plates. MAWSON AND SWAN, Mosley Street, Newcastle-on-Tyne, chemists and scientific instrument makers.



No 61921, Cl. 1, Feb. 8th, 1887.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. GEORGE FRIEDRICH OVERBECK, trading as G. F. Overbeck, Bremen, merchant and manufacturer.

CHLOROPHYLL.
Martin Perls & Co.

No. 60834, Cl. 1, Feb. 10th, 1887.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. MARTIN PERLS & Co., 62 & 63, Basinghall Street, London, chemical and colour merchants.



No. 62123, Cl. 1, Feb. 11th, 1887.—Photographic chemicals. BENJAMIN JOSEPH EDWARDS, trading as B. J. Edwards & Co, The Grove, Hackney, Middlesex, manufacturer.



No. 62325, Cl. 1, Feb. 19th, 1887.—Chemical substances used in manufactures, photography, or philosophical research, anti-corrosives and anti-foulers, including varnishes, dry colours, colours ground in oil, turpentine, or water, colours ready mixed for use, dry white lead and white lead ground in oil, dry zinc, oxide and zinc oxide ground in oil. WILKINSON, HEYWOOD & CLARK, 7, Caledonian Road, King's Cross, London, varnish, japan, colour and paint manufacturers.

THE "IMPERIAL"

No. 62958, Cl. 8, Mar. 9th, 1887.—Photographic cameras and photographic apparatus. SANDS & HUNTER, 20, Cranbourn Street, Leicester Square, London, W.C., manufacturers of photographic apparatus.



No. 63894, Cl. 8, April 7th, 1887.—Photographic cameras and apparatus. SANDS & HUNTER, 20, Cranbourn Street, Leicester Square, London, W.C, manufacturers of photographic apparatus.



No. 64776, Cl. 8, May 13th, 1887.—Photographic apparatus. LAVERNE AND CO., 10, Rue de Malte, Paris, France, opticians.



No. 65279, Cl. 1., June 2nd, 1881. Dry plate developer. PHOTOGRAPHIC APPARATUS AND CHEMICAL CO., LIMITED, 15, Barbican, and Australian Avenue, London, E.C., photographic apparatus manufacturers and dealers.



No. 64177, Cl. 1, July 12th, 1887.—Chemical substances used in manufactures, photographic or philosophical research, anti-corrosives and anti-foulers. WILLIAM GARRAD BAKER, RICHARD CHILD HEATH, THOMAS TYRER, and WILLIAM EDMUND BRANDFORD BLENKINSOP, trading as May and Baker, Garden Walk, Church Road, Battersea, Surrey, manufacturing chemists.

EURYSCOPIC

No. 66601, Cl. 8, Aug. 4th, 1887.—Binocular glasses, telescopes, microscopes, and camera lenses (being a series of lenses forming part of photographic cameras), but not including lenses sold separately. JOHN BROWNING, 63, Strand, St.-Martin's-in-the-Fields, Westminster, Middlesex, optician.



No. 66858, Cl. 1, Aug. 15th, 1887.—Acids for use in manufactures, photography, or philosophical research; aniline dyes (mineral), borax, glues, and white and red lead. LANGDALE'S CHEMICAL MANURE COMPANY, LIMITED, Newcastle-on-Tyne, chemical manure manufacturers.

ADAMANTA.

No. 67709, Cl. 1, Sept. 20th, 1887.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. The Patent Gum and Rubber Company, Limited, 18, Billiter Street, London, E.C., varnish and rubber manufacturers.



No. 67902, Cl. 1, Sept. 26th, 1887.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. The Patent Gum and Rubber Company, Limited, 18, Billiter Street, London, E.C., varnish and rubber manufacturers.



No. 68019, Cl. 1, Sept. 30th, 1887.—Chemical substances used in manufactures, including alkalies, acids, and chemicals of all kinds included in Class 1. William Marsh, Ash House, Chapel Road, Sale, near Manchester, chemical manufacturer.



No. 69074, Cl. 1, Nov. 3rd, 1887.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Hymans De Tiel, trading as Jacobus Hymans, 8, Minshull Street, Manchester, and Samarang, Java, merchant.



METEOR.

No. 69584, Cl. 1, Nov. 17th, 1887.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Shaw, Le Roy & Co., 84, Newhall Street, Birmingham, merchants.

LOTIFORM.

No. 69931, Cl. 1, Nov. 25th, 1887.—A material, or substance, or liquid, impregnated or combined with a chemical salt, or acid, or alkali, for the preparation of a solution for the preservation of any liquids used in philosophical experiments or photographic chemistry. The Sanitary Wood Wool Co., Ltd., 11, Hatton Garden, London, E.C., manufacturers of surgical dressings and appliances.



No. 70989, Cl. 1, Dec. 21st, 1887.—Glass plates coated with a chemically prepared emulsion for photographic purposes. Alfred Harman, trading as the Britannia Works, Company, Ilford, Essex, dry plate manufacturer.



No. 60591, Cl. 1 Dec 31st, 1887.—Photographic dry plates. Benjamin Joseph Edwards, trading as B. J. Edwards & Co., The Grove, Hackney, London, manufacturer.

WHITAKER'S



PHOTO-STAINS

No. 71407, Cl. 1, January 7th, 1888.—Colours for photographs. Joseph Birkett Whitaker, Kendal, Westmoreland, manufacturing chemist.



BULL'S HEAD BRAND.

No. 71895, Cl. 1, Jan. 20th, 1888.—Chemical substances used in manufactures, photography, and philosophical research, and anti-corrosives, but not including glue. Middleton, Kirkpatrick, & Barr, 4, Cullum Street, London, and Newcastle-on-Tyne and Glasgow, chemical merchants.



No. 74871, Cl. 1, April 10th, 1888.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Slevoght and Co., Shanghai, China, merchants.



No. 74872, Cl. 1, April 11th, 1888.—Chemical substances used in manufactures, photography, philosophical research, and anti-corrosives. Slevoght and Co., Shanghai, China, merchants.



No. 74879, Cl. 1, April 11th, 1888.—Dry plates, varnishes, developing solutions, being chemical preparations for use in photography. Percy Lund, trading as Percy Lund and Co., 20, St. John's Street, Bradford, photographic material merchant.



No. 75502, Cl. 1, April 27th, 1888.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Stolterfoht & Hirst, Hong Kong, merchants.

"KODAK"

No. 75818, Cl. 8, May 3rd, 1888.—Cameras and other photographic apparatus included in Class 8. The Eastman Dry Plate and Film Co., 115, Oxford Street, London, W., manufacturers.



No. 76682, Cl. 1, May 29th, 1888.—Chemical substances used in manufactures, photography, or philosophical research. Fairbridge, Holliday and Co., 57, King Street, Manchester, merchants.



No. 78854, Cl. 1, July 28th, 1888.—A chemical composition or material upon which to receive photographs.

ARTHUR JAMES WILLIS and RAYMOND WALTER WILLIS, trading as Willis and Willis, 1, Bracklyn Street, New North Road, London, N., engravers.



No. 78389, Cl. 8, July 17th, 1888.—Optical instruments. SHARP AND HITCHMOUGH, 101 and 103, Dale Street, Liverpoool, photographic instrument makers.

FRY'S PHOTOGRAPHIC DRY PLATES.

No. 80199, Cl. 1, Sept. 11th, 1888.—Photographic dry plates. SAMUEL FRY AND Co., LIMITED, Southsea Road, Kingston-on-Thames, and 5, Chandos Street, London, W.C., photographic dry plate manufacturers.

CORDERS



BRAND

NORTH SHIELDS

No. 80149, Cl. 1, Sept. 11th, 1888.—Acids for use in manufactures, photography, or philosophical research, alkalies, artists' colours, mineral dyes, glues, varnishes. WALTER SHEWELL, CORDER & Co., trading as W. S. Corder & Co., Low Lights, North Shields, manufacturing chemists.



No. 81289, Cl. 1, Oct. 17th 1888.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. SLEVOGHT AND Co., Shanghai, merchants.



No 81131, Cl. 8, Nov. 9th, 1888.—Photographic apparatus. WILLIAM HARDING WARNER, trading as W. Harding Warner and Co., The Hollies, Clyde Park, Redland, Bristol, artist photographer.



No 83550, Cl. 1, Dec. 11th, 1888.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. JUSTUS LEMBKE & Co., Shangai, Hong Kong, and Hamburgh, trading as the Honest Upright Trading Co., Shangai and Hong Kong, merchants.



No. 86699. Cl. 1, Feb. 15th, 1889.—Chemical and preparations used in photography included in Class 1. MERCKLIN & LASCKANN, Hanover, Germany, and 433, Strand, London, manufacturers.



No. 87030, Cl. 1, Feb. 25th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. SAMUEL BUDGETT AND Co., Carlton Chambers, Bristol, provision and general merchant.



No. 87287, Cl. 1, March 2nd, 1889.—Chemical substances used in manufactures, photography, and philosophical research, and anti-corrosives. William Taylor, jun., & Co., Limited, Taylor's Wharf, Limehouse, London, paint, colour, and varnish manufacturers.



No. 87795, Cl. 1. March 13th, 1889.—All articles comprised in Class 1, excepting glue, white lead, arsenic and boiler paste compositions. David Chadwick Hill, trading as J. and J. Thompson & Co., 275, Stamford Street, Ashton-under-Lyne, druggist.



No. 87841, Cl. 1, March 14th, 1889.—The whole class. John Birch & Co., Buxton Buildings, Chapel Street, Liverpool, merchants.



No. 87918, Cl. 15, March 15th, 1889.—Glass of all kinds. Thomas Webb and Sons, Limited, Stourbridge Glass Works, Stourbridge, Worcestershire, glass manufacturers.

No. 88687, Cl. 1, April 2nd, 1889.—Chemical substances used in manufactures, photography, philosophical research, and anti-corrosives. Walter R. Taylor & Co., 92 and 94, Whitechapel, Liverpool, paint, colour and varnish manufacturers, oil boilers and refiners.





No. 88911, Cl. 1, April 6th, 1889.—Chemical substances used in manufactures, photography, and philosophical research, anti-corrosives and anti-foulers, paints, varnishes and pigments. M. Holzappel & Co., Quayside, Newcastle-on-Tyne, manufacturers and merchants.

FACOPLATE.

No. 89098, Cl. 1, April 12th, 1889.—Paints, varnishes, artists' colours, and all other goods and chemical substances included in Class 1. Lizzie Holmes Goggs and Thomas Tebay Irving, trading as the Fine Art Co., 90, Bold Street, Liverpool, fine art dealers.



No. 89163, Cl. 1, April 15th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. William Taylor, jun., & Co., Ltd., Taylor's Wharf, Limehouse, London, paint, colour and varnish manufacturers, oil boilers and refiners.

"DEVELOPOIDS."

No. 89818, Cl. 1, May 9th, 1889.—Compressed chemical tablets to be used dissolved in water for the development of photographic plates and papers. Thomas Henry Powell, 116, Denmark Hill, London, S.E., pharmaceutical chemist.

PHOTOPEL.

No. 90136, Cl. 1, May 22nd, 1889.—Dry chemical pellets for photographic use. HENRY WILLIAM JONES, 3, Grosvenor Street, Coventry, chemist.



No. 91239, Cl. 15, June 27th, 1889.—Window glass, plate glass, painted glass, and goods of all kinds made of glass and not included in other classes. COWIE BROTHERS & Co , 196, St. Vincent Street, Glasgow, merchants.

VRIL

No. 91392, Cl. 1, July 3rd, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. BOVRIL, LIMITED, 30, Farringdon Street, London, merchants.



No 91786, Cl. 1, July 29th, 1889.—All articles comprised in Class 1. SIMPSON, MACKIRDY, and Co., the Moss Dye and Stain Works, Cullan's Close, 164, Cannongate, Midlothian, Scotland, manufacturers.



No. 91841, Cl. 15, July 26th, 1889.—Glass of all kinds contained in Class 15. COWIE BROS. & Co., 196, St. Vincent Street, Glasgow, merchants.



No. 91880, Cl. 1, July 29th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, namely, paints and varnishes. RABONE BROS. AND COMPANY, 297, Broad Sreet, Birmingham, merchants.

EIKONOGEN.

No. 92059, Cl. 1, August 9th, 1889.—Chemical substances and preparations used in photography. ACTIEN FABRIKATION, an der Treptower Brucke, Berlin, Germany—address for services in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 92082, Cl. 1, August 11th, 1889.—Levels, drawing instruments included in Class 8, mathematical instruments and other goods included in Class 8. JOHN QUAIL & Co., 18, Albert Square, Manchester, dealers in drawing papers, tracing papers, tracing cloths, mounted drawing paper, mathematical and surveying instruments.



No. 92537, Cl. 1, Sept. 10th, 1889.—Chemical substances used in manufactures or philosophical research, and anti-corrosives, and all goods covered by Class 1. G. SIEGLE & Co., Stuttgart, Germany—address for service in the United Kingdom, 22, Bush Lane, London, E.C.—colour manufacturers.



No. 92564, Cl. 1, Sept. 11th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, and all

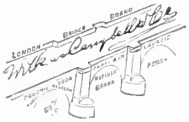
goods covered by Class 1. The Badische Anilin & Soda Fabrik, Ludwigshafen o/ Rhine, Germany, manufacturers of alizarine, aniline dyes—address for service in the United Kingdom, H. Beck, 22, Bush Lane, London, E.C.



No. 92829, Cl. 8, Sept. 26th, 1889.—All articles included in Class 8. John James Wood, 20, Lord Street, Liverpool, optician.



No. 92852, Cl. 1, Sept. 28th, 1889 — Caustic soda, and all other goods included in Class 1. Lindner & Co., 25, Broad Street, Birmingham, merchants.



No. 92916, Cl. 1, October 2nd, 1889.—All chemicals comprised under the heading of Class 1. Wilkins Campbell and Co., 50, Southwark Bridge Road, London, S.E., wholesale chemists, druggists, and drysalters.



No. 93154, Cl. 1, Oct. 15th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives except paints, varnishes, white and red leads, and colours other than dyes. Actien Gesellschaft für Anilin-Fabrikation, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93156, Cl. 1, October 15th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Actien Gesellschaft für Anilin-Fabrikation, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93162, Cl. 1, Oct. 15th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Actien Gesellschaft für Anilin-Fabrikation, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28. Southampton Buildings, London, W.C.—manufacturers.



No. 93170, Cl. 1, Oct. 15th, 1889.—Chemical snbstances used in manufactures, photography, or philosophical research, and anti-corrosives. Actien Gesellschaft für Anilin-Fabrikation, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93172, Cl. I, Oct. 15th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. ACTIEN GESELBSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brucke, Berlin, Germany—address for services in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93174, Cl. I, Oct. 15th, 1889.—Chemical substances used in manufactures, photography, and philosophical research, and anti-corrosives. ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93480, Cl. 1, Oct. 28th, 1889.—Photographic dry plates. JOHN ORME, trading as John Orme & Co., 65, Barbican, London, E.C., scientific apparatus manufacturer.



No. 93957, Cl. 1, Nov. 18th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93935, Cl. I, Nov 19th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including alkalies, or glue, or any goods of a like kind. ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93941, Cl. I, Nov. 19th, 1889.—Chemical substances used in manufactures, photography, philosophical research, and anti-corrosives. ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93953, Cl. 1, Nov. 19th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including compositions for preventing the radiation of heat, or caustic soda, or acetic acid, or photographic dry plates, or paints, or any other goods of a kind like to any of these excepted goods. ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brücke,

Berlin, Germany — address for service in the United Kingdom, 28, Southampton Buildings, London, W.C. —manufacturers.



No. 93955, Cl. 1, Nov. 19th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives except caustic soda. ACTIEN GESELLSCHAFT FUR ANILIN FABRIKATION, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93961, Cl. 1, Nov. 19th, 1889.—Chemical substances used in manufactures, pbotography, philosophical research, and anti-corrosives. ACTIEN GESELLSCHAFT FUR ANILIN FABRIKATION, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93963, Cl. 1, Nov. 19th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brücke, Berlin, Germany — address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.



No. 93969, Cl. 1, Nov. 19th, 1889.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION, an der Treptower Brücke, Berlin, Germany — address for service in the United Kingdom, 28, Southampton Buildings, London—manufacturers.



No. 95409, Cl. 1, Jan. 27th, 1890.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. ACTIEN-GESELLSCHAFT FUR ANILIN-FABRIKATION, an der Treptower Brücke, Berlin, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C. — manufacturers.



No. 95469, Cl. 8, Jan. 29th, 1890.—Chemical, philosophical and photographic instruments, apparatus and materials included in Class 8, but excluding vulcanite insulators. JOHN J. GRIFFIN AND SONS, LIMITED, 22, Garrick Street, Covent Garden, London, makers of chemical, philosophical and photographic instruments.

X L

No. 95726, Cl. 1, Feb. 10th, 1890.—Chemical substances used in photography. BENJAMIN JOSIAH EDWARDS,

trading as B. J. Edwards & Co, The Grove, Hackney, London, E., manufacturer.



No. 96939, Cl. 1, March 29th, 1890.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, including acids, including vegetable acids, and all others under Class 1. William Duckworth, trading as Duckworth and Co., 93, Corporation Street, Manchester, Lancashire, manufacturing chemist.



No. 97811, Cl. 1, May 15th, 1890.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including aniline dyes, being mineral dyes, or any article of a like kind. M. Raspe & Co., Japan—address for service in the United Kingdom, c/o Burchard & Raspe, 35, Eastcheap, London, E.C.—merchants.

SACCARINO.

No. 97835, Cl. 1, May 16th, 1890.—Chemical substances used in photography, and all other goods included in Class 1. Silvester Parry, Raymond House, Chester, photographer, and manufacturer of photographic apparatus.



No. 98239, Cl. 1, June 5th, 1890.—Chemical substances used in manufactures and photography, anti-corrosives and anti-foulers. Robert Pringle, trading as Robert Pringle & Co., 40 and 42, Clerkenwell Road, London, E.C., wholesale jeweller, silversmith, and refiner of gold and silver.



No. 99028, Cl. 1, July 11th, 1890.—Chemical substances used in manufactures, photography, or philosophical research, and anti corrosives. Gotscher and Co., 94, Newhall Street, Birmingham, export merchants.

ANÄSTHESIN.

No. 99040, Cl. 1, July 11th, 1890.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Farbwerke, Vorm, Meister Lucius, and Bruning Holchst, a1 Main, Germany—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.—manufacturers.

CYCLONE.

No. 151468, Cl. 1, Oct. 29th, 1890.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Henry William Fry, 32, Gresham Street, City Road, London, N., merchant, and Samuel Gurney Sheppard, 75, Old Broad Street, London, E.C., stockbroker.

KNOSSA

No. 152026, Cl. 1, Nov. 15th, 1890.—Artists' colours, pigments, dyes (mineral), and other substances included in Class 1. Frederick Hoyer, 37, Hurst Street, Liverpool, Lancashire, merchant.

PHARO

No. 160791, Cl. 8, Nov. 26th, 1890.—Photographic apparatus, including cameras, tripods, dark slides, and developing dishes. J. T. Clarke, Harrow, Middlesex, architect.



No. 152483, Cl. 8, Dec. 4th, 1890.—Photographic apparatus. The Eastman Photographic Materials Co., Ltd., 115, Oxford Street, London, W., manufacturers.



No. 152830, Cl. 1, Dec. 18th, 1890.—Chemical substances used in manufactures, photography and philosophical research, anti-corrosives, and anti-fouler, including compositions for ships' bottoms. Suta Hartman & Rahtjens Compositions Co, Ltd., 18, Billiter Street, London, merchants and manufacturers.



No. 152846, Cl 1, Dec. 18th, 1890.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Fabriques de Produits Chimiques, de Than et de Mulhouse à Than, Alsace, manufacturers—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.



No. 153882, Cl. 1, Feb. 5th, 1891.—Paints, pigments, and other goods included in Class 1. W. Brown, Sons and Co., 22, St. Enoch Square, Glasgow, manufacturers.



No. 154783, Cl. 8, March 12th, 1891.—Philosophical instruments, scientific instruments and apparatus for useful purposes, instruments and apparatus for teaching. Grenfell & Accles, Limited, The Holford Works, Perry Barr, Birmingham, Warwickshire, manufacturers of ordnance, and military and general engineers.

"KODAK"

No. 154848, Cl. 1, March 13th, 1891.—Photographic chemicals and all other goods included in Class 1. The Eastman Photographic Materials Co., Limited, 115, Oxford Street, London, W., manufacturers.

"KODAK"

No. 154849, Cl. 11, March 13th, 1891.—Photographic glass and all other goods included in Class 15. The Eastman Photographic Materials Co., Ltd., 115, Oxford Street, London, W.C.



No. 155009, Cl. 8, March 19th, 1891.—Photographic cameras and other photographic apparatus included in Class 8. The Eastman Photographic Materials Co., Ltd., 115, Oxford Street, London, W., manufacturers.



No. 155016, Cl. 1, March 20th, 1891.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. T. G. Hill & Co., 80, Major Street, Manchester, merchants.



No. 154496, Cl. 1, March 22nd, 1891.—Paints, pigments, colours, varnishes, and other substances included in Class 1. Alexander S. Fleming, Albion Chemical Works, Coatbridge, Lanarkshire, manufacturing chemists.



No. 155620, Cl. 1, April 14th, 1891.—Caustic soda, chlorates, soda ash, soda crystals, bicarbonates, all being goods included in Class 1, and all goods included in Class 1. The United Alkali Co., Ltd., 11, Exchange Buildings, Liverpool, alkali manufacturers, &c.



No. 156081, Cl. 1, April 30th, 1891.—Goods included in Class 1. Volkart Bros., Winterthur, Switzerland, merchants. Address for service in the United Kingdom, 11, Billiter Square, London, E.C.

KALLIO

No. 156352, Cl. 8, May 12th, 1891.—Finger ring gauges and other instruments and apparatus included in Class 8. Henry Robert William Lawson and John Barrow Ward, trading as Lawson & Ward, 5, Hatton Garden, London, manufacturing jewellers.

SPHINX

No. 15772S, Cl. 8, July 22nd 1891.—Philosophical instruments, scientific instruments and apparatus for useful purposes, instruments and apparatus for teaching. Grist and Turner, 53, Gracechurch Street, London, electrical engineers.



No. 158108, Cl. 1, August 12th, 1891.—Chemical substances used in manufactures, photography, and philosophical research, and anti-corrosives, including white lead, white lead ground in oil, zinc white, and zinc oxide, varnishes, dry colours, colours mixed ready for use, artists' colours, compositions for coating submerged structures, for preventing corrosion, for preventing ships' bottoms from fouling, and for ship and house painting, mineral dyes, enamels for coating metals, stain varnishes, lacquers, red lead, lamp black, ochre, potash and its preparations for use in manufactures, compound to prevent rust, size, wood stains and stain powders, transparent paint, colouring matters (mineral) for use in manufactures, and compositions in the nature of paint. J. Rudman, River Street, Bristol, oil and colour manufacturer.

CHOROSKOP

No. 158149, Cl. 8, August 14th, 1891.—A photographic lens. Carl Paul Caerz, Berlin, Germany, optician—address for service in the United Kingdom, c/o Arthur Schwarz & Co., Dashwood House, 9, New Broad Street, London, E C.



No. 158277, Cl. 1, August 20th, 1891.—Glycerine used in manufactures, photography, or philosophical research, but not including glycerine for use in the manufacture of paints, varnishes, colours, pigments, anti-fouling and preservative preparations, or the like. Price's Patent Candle Co., Ltd., 31, Threadneedle Street, London, soap and candle manufacturers.



No. 158618, Cl. 1, September 5th, 1891.—Chemical substances used in manufactures or philosophical research and anti-corrosives, *i.e.*, all goods covered by Class 1. BADISCHE ANALIN AND SODA FABRIK, Ludwigshafen o/ Rhine, Germany, manufacturers of alizarine, analine dyes, chemicals, etc.—address for service in United Kingdom, H. Beck, 22, Bush Lane, London, E.C.



No. 158934, Cl. 1, Sept. 19th, 1891.—Dry plates. prepared chemically or otherwise, for photographic purposes, or for use in connection with photography. THE IMPERIAL DRY PLATE CO., LTD., 1, Dufferin Street, Bunhill Row, London, E.C., and Cricklewood, London, N.W., manufacturers of dry plates for photographic purposes.

RODINAL

No. 159372, Cl. 1, Oct. 6th, 1891.—Chemical substances and preparations used in photography. ACTIEN-GESELLSCHAFT FUR ANALIN FABRIKATION, an der Treptower Brucke, Berlin, Germany, manufacturers—address for service in the United Kingdom, 28, Southampton Buildings, London, W.C.


THREE HARES AND THREE EARS.

No. 159507, Cl. 1, Oct. 12th, 1891.—Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. MULLER AND CO., 21, Mincing Lane, London, E.C., metal merchants.



No. 151141, Cl. 8, Oct. 16th, 1891.—Philosophical instruments, scientific instruments, and apparatus for useful purposes. MARINUS LEONARDUS NOORDHOEK, HEGT., trading as Noordhoek, Hegt and Co., Rangoon, Burmah, merchant—address for service in the United Kingdom, British Trade Protection Office, Monument Chambers, King William Street, London, E.C.



No 159976, Cl. 1, October 28th, 1891.—Chemical substances used in manufactures or philosophical research, and anti-corrosives, *i.e.*, all goods covered by Class 1. BADISCHE ANALIN AND SODA FABRIK, Ludwigshafen o/ Rhine, Germany, manufacturers of alazarine, analine dyes, chemicals, etc.—address for service in United Kingdom, H. Beck, 22, Bush Square, E C.



No. 160444, Cl. 1, Nov. 16th, 1891.—Photographic dry plates. A. H. HARMAN, trading as the Britannia Works Co., Ilford, Essex, manufacturer of photographic dry plates.



No. 160445, Cl. 1, Nov. 16th, 1891.—Photographic dry plates. A. H. HARMAN, trading as Britannia Works Co., Ilford, Essex, manufacturer of photographic dry plates.

MAPS AND GUIDE BOOKS.

ADVICE TO TOURISTS.

(*From the "Pall Mall Gazette."*)

"First buy your cycle. Then join the Cyclists' Touring Club. . . . . Next settle in your own mind where you are going, and what you want to see. Buy a good set of road maps, which can be obtained from any map publisher, or from Messrs. Iliffe & Son, 3, St. Bride Street, Ludgate Circus, E.C., who make a speciality of publishing maps prepared for cyclists, and sold at a very low figure."

*** Complete list will be sent, post free, on application.

ILIFFE & SON, 3, St. Bride Street, London, E.C.

THE WAY-ABOUT SERIES.

NOW READY, NO. 1.

The Way About Surrey.

WITH MAP AND NUMEROUS ILLUSTRATIONS.

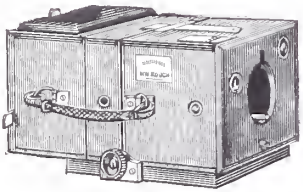
Price 1s.; post free 1s. 2d.

IN PREPARATION.

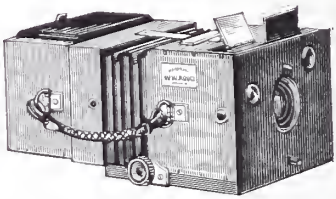
No. 2.—The Way About Kent.
No. 3.—The Way About Warwickshire.
No. 4.—The Way About Derbyshire.
No. 5.—The Way About Norfolk and Suffolk.
No. 6.—The Way About Essex.

ILIFFE AND SON, 3, ST. BRIDE STREET, LONDON, E.C.

ROUCH'S (PATENT)
'Excelsior' Hand Camera



"Excelsior" Camera Closed.
For use with the Short Focus Architecture Lens.
Lens Aperture Closed.



"Excelsior" Camera fully Extended.
For use with Long Focus Lens.
Lens Aperture Open.

THIS instrument surpasses all other Cameras of the Hand or "Detective" Class in the wide range of its powers, combining as it does a perfect Hand Camera, with an equally efficient one for general purposes. It is specially constructed for use with the **"EUREKA"** (Patent) **DETACHABLE CHANGING BACK,** though it can be equally well employed with ordinary double slides, or with a roll holder. But the features which chiefly distinguish it from other instruments of its class are—**First,** the power of using lenses of widely different focus. Though many Hand Cameras are adjustable in focus for a single lens, in none but the **"EXCELSIOR"** is provision made for the use of both wide and ordinary angle lenses. This Camera, however, is fitted with a rapid rectilinear lens for ordinary shutter and general landscape work or portraiture, and with a wide angle rectilinear of considerably shorter focus for interiors, and views in confined situations. Each of these has its separate outside focussing scale, and can be used with or without the focussing glass. **Secondly,** an entirely novel feature in this kind of Camera is introduced, which specially adapts it for architectural work, a branch in which the ordinary Hand Camera is at some disadvantage. By suitable means, which add nothing to the bulk of the instrument, a *rising front* is provided which enables the lens to be raised to any desired height, so as to bring on to the plate objects, or portions of objects, that would otherwise necessitate tilting the Camera.

PRICE of the "EXCELSIOR" Patent HAND CAMERA, with Two Lenses complete, for Plates $4\frac{1}{4} \times 3\frac{1}{4}$, £10 10s., and 5×4, £14 14s.

N.B.—Special attention is called to the fact that the **"EUREKA"** (Patent) **CHANGING BACK** is adapted to any ordinary Camera, and will be found by professionals, amateurs, tourists, or travellers generally, the readiest means of carrying a large number of plates when a dark room is not easily available. The backs can be constructed to carry any desired number of plates.

PRIZE MEDALS & AWARDS.—International Exhibition, London, 1862. Dublin International Exhibition, 1865. International Exhibition, Paris, 1867. International Exhibition, Bristol, 1881. London, 1885. Dundee, 1886. Crystal Palace, 1888. Highest Award for Apparatus at the International Inventions Exhibition, and the only Silver Medal for Gelatine Dry Plates.

For all other high-class Photographic Apparatus and Material, send for Rouch's New Illustrated Catalogue, 130 pages, post free 6d.

SOLE MANUFACTURERS AND PATENTEES:—

W. W. ROUCH & CO.,

Contractors to Her Majesty's Government, **180, STRAND.**

Manufactory: 43, NORFOLK ST., STRAND, LONDON, W.C.

Section IX.

INFORMATION

OF USE TO AND CONCERNING

THE PHOTOGRAPHIC TRADE.

GOLD MEDALS AND HIGHEST AWARDS.

London, 1851. Paris, 1867. London, 1862. Philadelphia, 1876. Paris, 1878. Antwerp, 1878. Inventions Exhibition, 1885. Sydney, 1879. Grand Prix and Gold Medal, Paris, Exposition Universelle, 1889. Kingston, Jamaica, 1891, &c., &c.

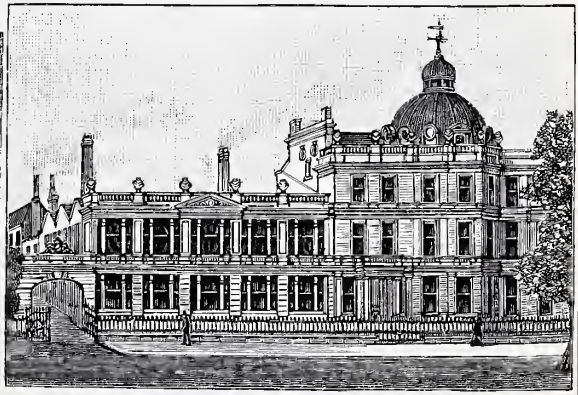
ROSS'

Portrait And View Lenses.



SHOW ROOMS and FULLY EQUIPPED DARK ROOM,

For the Convenience of Purchasers, at 112, New Bond Street.



ROSS' NEW OPTICAL WORKS.

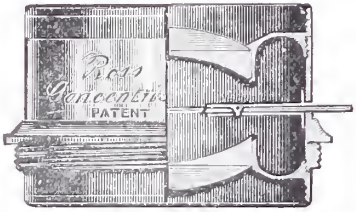
ROSS & Co.,

Manufacturing Opticians,

112, NEW BOND ST., LONDON, W.,

AND 3, CLAPHAM COMMON, S.W.

Ross' Patent Concentric Lenses



The most perfect Lenses for

Landscapes, Architecture, Copying, etc.

Ratio of Stops : f/22, f/27, f/32, f/38, f/45.

The Concentric Lenses are the most perfect ever introduced, being absolutely free from distortion, astigmatism, flare, and other imperfections incidental to all lenses of ordinary construction.

The Concentric Lenses give uniformly perfect definition with uniform illumination over an absolutely flat field of a circle of about 75°, the extreme oblique rays coming to focus with the same remarkable sharpness as the central pencils; and therefore, these lenses will cover a larger plate when desired than those specified.

The Concentric defines perfectly with its full aperture, and does not require the use of stops to obtain marginal definition as in other lenses; the stops therefore need only be used to regulate the time of exposure and the depth of focus.

One combination of the Concentric may be used for landscapes, architecture, copying, etc., and the results will be found superior to those obtained by ordinary Single Lenses, as the Single Concentric gives absolutely straight lines and equal illumination all over the field.

Prices and Sizes of the Patent Concentric Lenses.

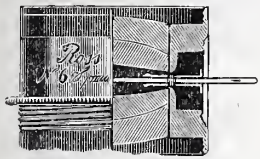
No.	Size of Plate.	Circle of Light, about 80 dia.	Equivalent Focus.	Price.	
				Rotary Stops.	Iris Diaphragm.
1	3 x 3	5 inches.	3 inches.	£4 0 0	£4 10 0
2	4¼ x 3¼	6·7 "	4 "	4 0 0	4 10 0
3	5 x 4	8·4 "	5 "	5 0 0	5 10 0
4	6½ x 4¾	10·8 "	6 "	6 0 0	6 10 0
5	8 x 5	11·8 "	7 "	7 0 0	7 12 6
6	8½ x 6½	13·4 "	8 "	8 0 0	8 14 0
7	9 x 7	15 "	9 "	9 0 0	9 15 0
8	10 x 8	16·8 "	10 "	10 0 0	10 15 0
9	12 x 10	20 "	12 "	12 0 0	12 15 0
10	15 x 12	25 "	15 "	15 0 0	16 0 0
11	18 x 16	30 "	18 "	18 0 0	19 10 0

ROSS & Co., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

ROSS'

Portable Symmetrical Lenses.



PORTABLE SYMMETRICAL LENS.

U.S. Nos. ..	16	32	64	128	256
Ratio of Stops	$\frac{f}{16}$	$\frac{f}{22{\cdot}6}$	$\frac{f}{32}$	$\frac{f}{45{\cdot}2}$	$\frac{f}{64}$

Since their introduction, perhaps no Lens has had so great a share of popularity as the Portable Symmetricals. They are universally used by many of our most eminent Photographers. This is, doubtless, attributable to their extraordinary definition and flatness of field, as well as to the exceedingly portable form in which they are made. The adoption of the Jena Glass in their construction has still further increased their brilliancy and depth of focus.

Prices, Sizes, etc., of the Portable Symmetrical Lenses.

No.	Size of Plate with Large Stop.	Size of Plate with Med'm Stop	Diameters of Lenses.	Equiv. Focus.	Price. Brass Settings.	Price. Aluminium Settings.	Extra for Iris Diaphragm.
*1	3 x 3	4 x 3	$\frac{5}{10}$ inch.	3 ins.	£3 0 0	£3 17 6	£0 10 0
*2	4 x 3	5 x 4	$\frac{11}{20}$ "	4 "	3 5 0	4 3 6	0 10 0
*3	5 x 4	$6\frac{1}{2}$ x $4\frac{3}{4}$	$\frac{13}{20}$ "	5 "	3 10 0	4 9 6	0 10 0
*4	$6\frac{1}{2}$ x $4\frac{3}{4}$	8 x 5	$\frac{15}{20}$ "	6 "	4 0 0	5 0 0	0 10 0
5	8 x 5	$8\frac{1}{2}$ x $6\frac{1}{2}$	$\frac{18}{20}$ "	7 "	5 0 0	6 1 0	0 10 0
6	$8\frac{1}{2}$ x $6\frac{1}{2}$	9 x 7	$\frac{19}{20}$ "	8 "	6 0 0	7 1 6	0 10 0
7	9 x 7	10 x 8	1 "	9 "	7 0 0	8 2 0	0 10 0
8	10 x 8	12 x 10	$1\frac{1}{8}$ "	10 "	8 0 0	9 2 6	0 10 0
9	12 x 10	13 x 11	$1\frac{1}{8}$ "	12 "	9 0 0	10 3 0	0 10 0
10	13 x 11	15 x 12	$1\frac{1}{4}$ "	15 "	10 0 0	11 3 6	0 10 0
11	15 x 12	18 x 16	$1\frac{1}{2}$ "	18 "	12 0 0	13 10 0	0 15 0
12	18 x 16	22 x 20	$1\frac{3}{4}$ "	21 "	15 0 0	16 10 0	0 15 0

* *These Lenses are supplied accurately paired for Stereoscopic purposes.*

The first ten of the series, having their screws alike, fit into the same flange (No. 1 on list, page 3), and are so very light and portable that they can conveniently be transmitted by post. Nos. 11 and 12 fit into flanges; No. 4 on list, page 3.

Nos. 1 to 8 have Rotating Diaphragms.
Nos. 9 to 12, Waterhouse Diaphragms.

Or any of the series are supplied with Ross' Improved "Iris" Diaphragm without any increase in the outside dimensions of the Body Tube.

In reference to the qualities of these Lenses—

G. W. Wilson, Esq., *writes:* "The Short Focus Symmetricals are the finest lenses I ever used, and the longer focussed are simply unapproachable for definition and flatness of field."

F. Frith, Esq., *writes:* "I got a very fine instantaneous negative (11 x 7) with many figures, using the No. 10 Symmetrical with full aperture."

F. M. Good, Esq., *writes:* "I am perfectly charmed with your Symmetrical Lens."

W. J. Stillman, Esq., *writes:* "The working of the Symmetrical Lens is simply marvellous."

A. H. Fry, Esq., *writes:* "The No. 5 Symmetrical covers whole plate to the margin without stops, good depth of focus, and very brilliant picture."

W. K. Burton, Esq., *writes:* "I find the Symmetrical a magnificent instrument."

ROSS & Co., Opticians, 112, New Bond Street, LONDON, W.

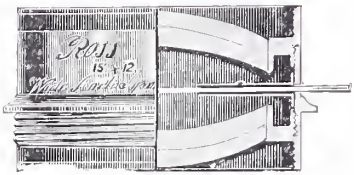
Manufactory—CLAPHAM COMMON.

ROSS'

Wide-angle Symmetrical Lenses

(New Series)

FOR LANDSCAPES, ARCHITECTURE, AND CONFINED SITUATIONS.



WIDE-ANGLE SYMMETRICAL LENS.

U.S. Nos.	16	32	64	128	256
	f	*f*	*f*	*f*	*f*
Ratio of Stops	16	22.6	32	45.2	64

THESE Lenses, like the Symmetricals of the Rapid and Extra-rapid Series, are entirely free from distortion and flare, and give sharp definition. They are constructed for 90° and upwards, a wider angle, we believe, than given by any wide-angle lenses hitherto issued, with equal definition at the margin of the plate. These Lenses are confidently recommended for architectural subjects, for all wide-angle work, and are very suitable for use in confined situations.

Prices, Sizes, etc., of the Wide-angle Symmetrical Lenses.

No.	Size of Plate.	Diameters of Lenses.	Equ. Focus.	PRICE. Brass Settings	Aluminium Settings.	Extra for Iris Diaphragm.	Flanges.
*1	5 x 4	$\frac{6}{10}$ inch	3 inches	£3 3 0	£4 0 6	£0 10 0	No. 1
*2	$7\frac{1}{4}$ x $4\frac{1}{2}$	$\frac{8}{10}$,,	4 ,,	3 10 0	4 7 6	0 10 0	1
*3	$8\frac{1}{2}$ x $6\frac{1}{2}$	1 ,,	5 ,,	4 0 0	4 18 6	0 10 0	1
4	10 x 8	$1\frac{1}{4}$,,	6 ,,	5 0 0	5 18 6	0 10 0	2
5	12 x 10	$1\frac{1}{4}$,,	7 ,,	6 6 0	7 6 0	0 12 0	3
6	13 x 11	$1\frac{3}{4}$,,	8 ,,	7 10 0	9 0 0	0 14 0	4
7	15 x 12	2 ,,	9 ,,	9 9 0	11 19 0	0 16 0	5
8	18 x 16	$2\frac{1}{2}$,,	12 ,,	14 0 0	19 0 0	1 0 0	8
9	22 x 18	3 ,,	14 ,,	18 0 0	25 0 0	1 5 0	10
10	25 x 22	$3\frac{1}{2}$,,	16 ,,	25 0 0	35 0 0	1 10 0	13

** These Lenses are supplied accurately paired for Stereoscopic purposes.*

Rotary Diaphragms are usually supplied, but Ross' Improved "Iris" Diaphragm can be adapted to any of the series when desired.

In reference to the qualities of the Symmetrical Lenses—

G. H. RIPLEY, Esq., *writes*: "The Symmetrical Lenses are simply perfect; exquisite fineness, and depth of focus marvellous."

W. H. PRICE, Esq., *writes*: "The Symmetrical is a splendid Lens."

H. LORD, Esq., *writes*: "The Symmetrical is a perfect gem."

C. WILSON, Esq., *writes*: "The Symmetrical covers well centre and margin, with depth of focus, definition, and quite a round crisp image."

CAPTAIN TURTON, R.N., *writes*: "The Symmetrical gives very excellent negatives."

OWEN ANGEL, Esq., *writes*: "The Symmetrical is a wonderful little instrument, and eclipses all others in my possession."

C. D. ARNOLD, Esq., *writes*: "The Portable Symmetricals are marvels in optics for definition, even illumination, and flatness of field."

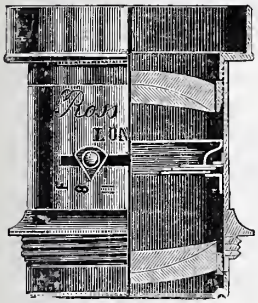
ROSS & CO., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

ROSS'

Rapid Symmetrical Lenses.

(NEW FORMULA) FOR GROUPS, VIEWS, INTERIORS, COPYING, ETC.



RAPID SYMMETRICAL LENS.

U.S. Nos.	4	8	16	32	64	128	256
Ratio of Stops ...	$\frac{f}{8}$	$\frac{f}{11.3}$	$\frac{f}{16}$	$\frac{f}{22.6}$	$\frac{f}{32}$	$\frac{f}{45.2}$	$\frac{f}{64}$

The Rapid Symmetricals, being aplanatic, work with full aperture, and on account of their varied capabilities are, perhaps, the most useful Lenses an Amateur or Professional Photographer can possess for general outdoor purposes. The use of special optical glass and improved formula has greatly enhanced the optical properties of these Lenses.

With smaller Stops each Lens covers the next size larger plate than that given, thereby greatly increasing the angle of view. The Rapid Symmetricals are not so suited for Portraits and Groups as Lenses with larger apertures, but excellent results are obtained in a good light in the open air. They are furnished with Waterhouse Diaphragms, or with Ross' improved Iris Diaphragm, without any increase in the outside dimensions of the body tube.

Prices and Sizes of the Rapid Symmetrical Lenses.

Size of View	Size of Group.	Diameters. of Lenses.	Equ. Focus	Price in Rigid Fitting. With Waterhouse Diaphragms	Aluminium Settings.	Extra for Iris Diaphragm.	Flanges.
3 x 3	... ...	$\frac{5}{8}$ inch	3 inches	£3 10 0	£4 10 0	£0 10 0	No 1
*$4\frac{1}{4}$ x $3\frac{1}{4}$	Stereo.	$\frac{3}{4}$ "	$4\frac{1}{2}$ "	4 0 0	5 4 0	0 10 0	1
*5 x 4	$4\frac{1}{4}$ x $3\frac{1}{4}$	1 "	6 "	4 5 0	5 11 0	0 10 0	1
6 x 5	5 x 4	$1\frac{1}{16}$ "	$7\frac{1}{2}$ "	5 5 0	6 12 0	0 10 0	1
8 x 5	$7\frac{1}{4}$ x $4\frac{1}{4}$	$1\frac{3}{8}$ "	9 "	5 15 0	7 4 0	0 12 6	2
$8\frac{1}{2}$ x $6\frac{1}{2}$	8 x 5	$1\frac{1}{2}$ "	$10\frac{1}{2}$ "	6 10 0	8 4 0	0 14 0	3
9 x 7	$8\frac{1}{2}$ x $6\frac{1}{2}$	$1\frac{3}{4}$ "	12 "	7 10 0	9 4 0	0 15 0	4
10 x 8	9 x 7	$1\frac{7}{8}$ "	14 "	8 10 0	10 10 0	0 17 6	5
12 x 10	10 x 8	2 "	16 "	10 10 0	14 0 0	1 1 0	6
13 x 11	11 x 9	$2\frac{1}{4}$ "	18 "	11 10 0	16 10 0	1 5 0	7
15 x 12	13 x 11	$2\frac{1}{2}$ "	20 "	14 10 0	20 10 0	1 10 0	8
18 x 16	15 x 12	3 "	24 "	18 10 0	26 10 0	2 2 0	11
22 x 18	18 x 16	$3\frac{3}{4}$ "	30 "	25 0 0	35 0 0	2 15 0	12
25 x 22	22 x 18	$4\frac{1}{2}$ "	34 "	30 0 0	45 0 0	3 10 0	15

** These Lenses are supplied accurately paired for Stereoscopic purposes.*

O. SARONY, Esq., *writes:* "I never worked with Lenses that gave more satisfaction than your Rapid Symmetricals."

H. W. TAUNT, Esq., *writes:* "We have rechristened the Lens ('The Pet'); it has superseded nearly every lens I have for its class of work."

H. DIXON, Esq., *writes:* "We used your Rapid Symmetrical Lenses for some of o r exhibits."

MAJOR-GEN. PRESTON *writes:* "I fiud the whole-plate Rapid Symmetrical a most beautiful instrument; its great charm is its depth of focus."

G. H. RIPLEY, Esq., *writes:* "I am doing work that is exciting universal and symmetrical admiration and envy of both friends and competitors."

Messrs. G. WEST & SON *write:* "Our instantaneous photographs of yachts, which have received a Medal at the Exhibition, were taken with your Rapid Symmetrical Lens."

H. G. ROGERS, Esq., *writes:* "The 8 x 5 Rapid Symmetrical gives pictures both sharp and good; nothing could be better."

G. L. BURGE, Esq., *writes:* "An excellent Lens, and worth its weight in gold."

J. WINGRAVE, Esq., *writes:* "The *ne plus ultra* of a Lens, definition excellent, and lines perfectly straight."

H. COOPER, Esq., *writes:* "A magnificent Lens for general work."

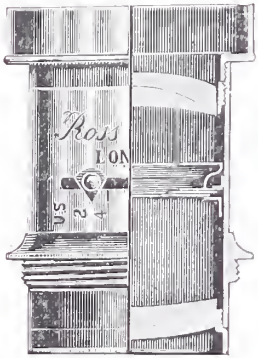
ROSS & Co., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

ROSS'
Universal Symmetrical Lenses

(NEW SERIES, EXTRA RAPID).

For Landscapes, Portraits, Groups, and Instantaneous Pictures.



UNIVERSAL SYMMETRICAL LENS.

And every description of Outdoor Photography.

U.S. Nos....	2	4	8	16	32	64	128	256
Ratio of Stops	$\frac{f}{5{\cdot}657}$	$\frac{f}{8}$	$\frac{f}{11{\cdot}3}$	$\frac{f}{16}$	$\frac{f}{22{\cdot}6}$	$\frac{f}{32}$	$\frac{f}{45{\cdot}2}$	$\frac{f}{64}$

These Lenses work with double the rapidity of the Rapid Symmetrical Series. They are the result of exhaustive calculations, and are constructed of Special Optical Glass, are perfectly aplanatic, give brilliant pictures with full aperture. They are very suitable for Studio work, and when stopped down to the same extent as the Rapid Symmetricals they are equally adapted for all kinds of Outdoor Photography, Copying, and Enlarging. Their great rapidity renders them specially suitable for obtaining fully exposed instantaneous pictures with rapid shutters, and the smaller sizes are invaluable for use in Detective Cameras.

These Lenses are furnished with Waterhouse Diaphragms, or with Ross' Improved "Iris," without any increase in the outside dimensions of the body tube.

Prices, Sizes, &c., of the Universal Symmetrical Lenses.

Size of View	Size of Group.	Diameters of Lenses.	Equ. Focus	Price in Rigid Setting. With Waterhouse Diaphragms	Aluminium Settings.	Extra for Iris Diaphragm.	Flanges.
4¼ x 3¼	3 x 3	1 inch.	4½ ins.	£5 0 0	£6 7 0	£0 10 0	No. 1
5 x 4	4¼ x 3¼	1 3/16 "	6 "	6 10 0	7 19 0	0 12 6	2
6 x 5	5 x 4	1 3/8 "	7½ "	7 17 6	9 9 6	0 14 0	3
8 x 5	6 x 5	1 7/8 "	9 "	8 12 6	10 6 6	0 15 0	4
8½ x 6½	8 x 5	2 "	10½ "	9 15 0	11 15 0	0 17 6	5
9 x 7	8½ x 6½	2¼ "	12 "	11 10 0	15 0 0	1 5 0	6
10 x 8	9 x 7	2 5/16 "	14 "	14 0 0	19 0 0	1 10 0	8
12 x 10	10 x 8	2 7/16 "	16 "	16 16 0	22 16 0	2 2 0	9
13 x 11	12 x 10	3 1/16 "	18 "	18 18 0	26 18 0	2 10 0	11
15 x 12	13 x 11	3 3/8 "	20 "	24 0 0	34 0 0	2 15 0	14
18 x 16	15 x 12	4 1/16 "	24 "	32 0 0	47 0 0	3 10 0	16
22 x 18	18 x 16	5½ "	30 "	50 0 0	70 0 0	4 5 0	—

Among other laudatory testimonials received since the recent issue of this new series of Lenses, the following are given as indicative of their qualities:—

Rev. William Law *writes:* "Your new Universal Symmetrical is a first-rate Lens, and cannot for all purposes be surpassed; its qualities for rapidity of action and fitness for landscape work exceeded expectation. Its defining power and depth of focus are marvellous."

Rev. W. E. Hancock *writes:* "The Universal Symmetrical combines with the brilliant definition of the Portrait Lens and its light grasping power all the good points of the Rapid Symmetrical, and thus becomes equally valuable for sitting-room portraiture and the field."

Sir J. P. Ratcliffe, Bart., *writes:* "The Lens came safely to hand, and I am much pleased with the brilliancy of the picture."

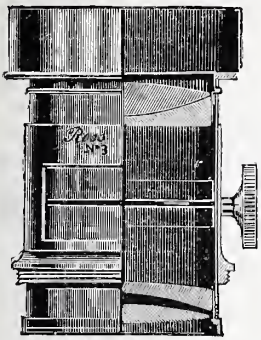
Louis Meldon, Esq., *writes:* "I had a practical day with the new Lens, and got some most excellent things in light that was not good."

T. G. Whaite, Esq., *writes:* "I believe this is the Lens of the future for professional work. It is the happy medium between the old Portrait form and the Rapid Symmetrical; gives wonderful illumination, and indeed greater depth of focus than we require in the studio for artistic work. Working as it does with the largest diaphragm, it is by far the most rapid lens I know in the market."

ROSS & Co., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

Ross' Improved Portrait Lenses



NO. 3 PORTRAIT LENS, ONE-THIRD SIZE.

These Lenses are on the Petzval formula, and have a full aperture exceeding *f*/4. They are constructed to give all the sharpness that can be optically obtained, and enlargements from small negatives may be produced with them, which will compare favourably with others of the same size taken direct with a large lens. This is the most severe test of their defining power.

When a Portrait Lens is used or standing figures, it is desirable to employ one of longer focus than necessary to cover the plate, as it can be worked with a larger stop, and consequently with greater rapidity.

No. 1 and No. 2 Portrait Lenses are not now made, having been superseded by the Carte-de-Visite and Cabinet Lenses, which give a flatter field and better marginal definition.

No. 3 Portrait Lens, lenses $3\frac{1}{4}$ inches in diameter, back focus 10 inches. Produces fine Portraits on plates $6\frac{1}{2} \times 4\frac{3}{4}$ .. Price £17 10 0

No. 3A Ditto ditto, lenses 4 inches diameter, 12 inches focus, for pictures on plates $8\frac{1}{2}$ x $6\frac{1}{2}$ inches and under .. .. Price 27 0 0

No. 4 Ditto ditto, lenses $4\frac{1}{2}$ inches diameter, 15 inches focus, for pictures on plates 10 x 8 inches and under .. .. Price 38 0 0

No. 5 Ditto ditto, lenses 5 inches diameter, 20 inches focus, for portraits on plates 15 x 12 and under .. .. .. Price 42 10 0

No. 6 Ditto ditto, lenses 6 inches diameter, 24 inches focus, for portraits on plates 18 x 16 and under .. .. .. Price 54 0 0

The above prices include a set of Waterhouse Diaphragms in morocco case.

These Lenses are admirably adapted for Vignettes, Half-lengths, and Sitting Figures, but for Full-lengths the Cabinet and Carte Series are preferable, having a flatter field.

M. GUTTENBERG, ESQ., *writes:* "I am more than satisfied with your No. 5 Portrait Lens. It is really A1."

Messrs. LOWTHIAN BROS. *write:* "Your No. 3 Portrait is a splendid Lens, and gives great satisfaction."

H. R. BARRAUD, ESQ., *writes:* "The No. 5 Lens leaves little for any new Lens to surpass."

C. KNIGHT, ESQ., *writes:* "Your 3A Portrait Lens is a treasure."

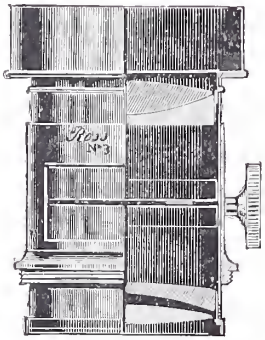
J. E. MAYALL, ESQ., *writes:* "I do not know that I have ever seen so splendid a Lens in all my experience."

ROSS & Co., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

ROSS'

Rapid Cabinet & Carte-de-Visite Lenses.



NO. 3 CARTE-DE-VISITE LENS, HALF SIZE.

Ross' "CABINET" and "CARTE" LENSES differ from ordinary Portrait Lenses in being constructed with as flat a field as is consistent with good marginal definition. They are invaluable for the production of either standing or sitting figures with full aperture, and give very rapid results with brilliancy and exquisite defining power.

CABINET LENSES.

No. 1 Cabinet Lens, $2\frac{3}{4}$ inches clear aperture, 6 inches focus; should be placed at 14 feet from the sitter	£13 0 0
No. 2 Ditto ditto, $3\frac{1}{4}$ inches clear aperture, 8 inches focus; should be placed at 18 feet from the sitter	17 10 0
No. 3 Ditto ditto, $3\frac{1}{2}$ inches clear aperture, 10 inches focus; should be placed at 20 feet from the sitter	19 10 0

The above prices include a set of Waterhouse Diaphragms in morocco case.

In choosing a Cabinet Lens the same rule applies as in the selection of a *Carte* Lens; viz., that for obtaining the best results it is desirable to use No. 3 when the Studio exceeds 20 feet in length. Many of the finest Cabinet portraits from the first Studios in Paris, London, and New York are taken with this Lens.

CARTE-DE-VISITE LENSES.

No. 1 Carte-de-Visite Lens, $1\frac{3}{4}$ inch diameter, $4\frac{1}{2}$ inches focus; requires 14 feet between the subject and Camera	£5 15 0
No. 2 Ditto ditto, $2\frac{1}{16}$ inches diameter, $4\frac{3}{4}$ inches focus; requires 16 feet between the subject and Camera	6 10 0
No. 3 Ditto ditto, $2\frac{1}{2}$ inches diameter, 6 inches focus; requires from 19 to 20 feet between the subject and Camera	11 10 0

In all cases where the length of Studio exceeds 20 feet, it is desirable, to obtain the best results, to use the No. 3 C.-D.-V. Lens, in consequence of the pleasing pictures and correct perspective obtained; for short Studios (less than 20 feet) the No. 2, or even No. 1, will be found to give excellent results; but it is recommended that a Diaphragm be used, and care be taken that the Camera is placed at a proper elevation.

About Ross' Cabinet and Carte-de-Visite Lenses—

W. FAULKNER, Esq., *writes:* "I made use of your Cabinet Lens for producing the pictures of children on view at the Photographic Society's Exhibition."

W. EDMISTON, Esq., *writes:* "The longer I use your Carte Lens the better I like it."

G. P. CARTLAND, Esq., *writes:* "My medal photographs of dogs were taken with your Rapid Cabinet Lens."

A. E. DEAN, Esq., *writes:* "I am very pleased with the Carte Lens; it is really first-class."

W. J. BYRNE, Esq., *writes:* "Our Cabinet photographs at the Exhibition were taken with your No. 3 Lens."

ROSS & Co., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

UNIVERSAL LENSES.

For Groups, Portraits, or Studies in the Studio, Interiors, Copying, &c.

THE "UNIVERSAL" Lenses have great freedom from flare, with sharpness depth of focus, and flatness of field—qualities so necessary in producing first-rate negatives for direct printing or enlargements.

Nos.	1	2	3	4	5
Focus....	8½ in.	10¾ in.	13½ in.	16⅝ in.	20 in.
Views....	8½ × 6½	10 × 8	12 × 10	15 × 12	18 × 16
Groups ..	7¼ × 4½	8½ × 6½	10 × 8	12 × 10	15 × 12
Prices....	£7 10 0	£9 0 0	£12 10 0	£16 10 0	£25

The "UNIVERSALS" are not designed to compete with the Rapid Portrait Lenses, which have about twice their intensity when used with full aperture, but on account of their excellent covering qualities and moderate cost, they will be much appreciated for taking large portraits, busts, and groups in the open air, or in well-lighted studios, when the expense of a large portrait lens is an objection

ROSS'

Special Lenses for Hand Cameras.

In Bronzed Mounts. Can be supplied accurately paired when required.	Working at F/8.		Working at F/5·657.	
	With Ordinary Diaphragms.	With Iris Diaphragms.	With Ordinary Diaphragms.	With Iris Diaphragms.
3 in. focus for 3 × 3 plates ..	£3 7 6	£3 17 6	£4 5 0	£4 15 0
,, 4¼×3¼ ,, ...	3 15 0	4 5 0	4 15 0	5 5 0
,, ,, 5 ×4 ,, ...	0 0	4 10 0	5 0	6 5 0

ROSS & CO., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

SERIES III. (Patent).

Zeiss Anastigmat 1:7.2. (Rapid Lens)

MANUFACTURED BY

ROSS & CO., SOLE LICENSEES FOR THE BRITISH EMPIRE.

No.	Equivalent focus. mm.	Equivalent focus. in.	Free diameter of largest lens mm.	Free diameter of largest lens in.	Size of plate covered with stop $f/12.5$ cm.	Size of plate covered with stop $f/12.5$ in.	Diameter of image circle at 80° cm.	Diameter of image circle at 80° in.	Price, with Waterhouse Stops. £	s.	d.
1	96	$3\frac{3}{4}$	16	$\frac{5}{8}$	8×10	$3\frac{1}{8}\times 4$	16	$6\frac{5}{16}$	3	10	0
2	120	$4\frac{3}{4}$	19 5	$\frac{3}{4}$	9×12	$3\frac{1}{2}\times 4\frac{3}{4}$	20	$7\frac{7}{8}$	4	0	0
3	148	$5\frac{13}{16}$	25	1	12×15	$4\frac{3}{4}\times 5\frac{7}{8}$	25	$9\frac{7}{8}$	4	10	0
4	195	$7\frac{11}{16}$	31	$1\frac{1}{4}$	13×18	$5\frac{1}{8}\times 7$	33	$12\frac{7}{8}$	6	0	0
5	220	$8\frac{5}{8}$	36	$1\frac{3}{8}$	13×21	$5\frac{1}{8}\times 8\frac{1}{4}$	38	15	7	10	0
6	250	$9\frac{7}{8}$	42	$1\frac{5}{8}$	16×21	$7\times 8\frac{1}{4}$	42	$16\frac{1}{2}$	9	0	0
7	315	$12\frac{3}{8}$	51.5	2	18×24	$7\times 9\frac{1}{2}$	53	$20\frac{7}{8}$	12	0	0
8	442	$17\frac{3}{8}$	71	$2\frac{3}{4}$	24×30	$9\frac{1}{2}\times 11\frac{3}{4}$	74	$29\frac{1}{8}$	19	0	0
9	586	23	94	$3\frac{3}{4}$	30×40	$11\frac{3}{4}\times 15\frac{3}{4}$	98	$38\frac{5}{8}$	27	0	0

Series IV. Zeiss Anastigmat 1:12.5. (Patent).

Rapid Wide-angle and Copying Lens.

No.	Equivalent focus mm.	Equivalent focus in.	Free diameter of largest lens mm.	Free diameter of largest lens in.	Size of plate covered with stops $f/18$—$f/25$. cm	Size of plate covered with stops $f/18$—$f/25$. in.	Diameter of image circle at 96° cm.	Diameter of image circle at 96° in.	Price, with Waterhouse Stops. £	s.	d.
1	62	$2\frac{7}{16}$	6	$\frac{1}{4}$	8×10	$3\frac{1}{8}\times 4$	14	$5\frac{1}{2}$	3	4	0
2	98	$3\frac{7}{8}$	9		9×12	$3\frac{1}{2}\times 4\frac{3}{4}$	22	$8\frac{5}{8}$	3	4	0
3	119	$4\frac{3}{4}$	12	$\frac{1}{2}$	12×15	$4\frac{3}{4}\times 5\frac{7}{8}$	27	$10\frac{5}{8}$	3	4	0
4	154	$6\frac{1}{16}$	15 5	$\frac{5}{8}$	13×21	$5\frac{1}{8}\times 8\frac{1}{4}$	34	$13\frac{3}{8}$	4	0	0
5	196	$7\frac{11}{16}$	20	$\frac{3}{4}$	18×24	$7\times 9\frac{1}{2}$	44	$17\frac{1}{4}$	5	0	0
6	260	$10\frac{1}{4}$	26	1	24×30	$9\frac{1}{2}\times 11\frac{3}{4}$	58	$22\frac{7}{8}$	7	10	0
					with stop $f/36$		at 85°				
7	386	$15\frac{5}{16}$	33	$1\frac{5}{16}$	30×40	$11\frac{3}{4}\times 15\frac{3}{4}$	71	28	10	0	0
8	605	$23\frac{7}{8}$	51	2	40×50	$15\frac{3}{4}\times 19\frac{3}{4}$	110	$43\frac{1}{4}$	17	10	0
9	906	$35\frac{3}{4}$	75	3	50×60	$19\frac{3}{4}\times 23\frac{1}{2}$	163	$64\frac{1}{4}$	40	0	0
10	1228	48	99	$3\frac{7}{8}$	60×75	$23\frac{1}{2}\times 29\frac{1}{2}$	219	86	90	0	0

ROSS & CO., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

SERIES V. (Patent).

Zeiss Anastigmat 1:18. (Wide-angle and Copying Lens.)

MANUFACTURED BY

ROSS & CO., SOLE LICENSEES FOR THE BRITISH EMPIRE.

No.	Equivalent focus		Free diameter of largest lens.		Size of plate covered with stop $f/36$.		Diameter of image circle at 104°		Price with Waterhouse stops.
	mm.	in.	mm.	in.	cm.	in.	cm.	in.	
1	86	$3\frac{3}{8}$	7·5	$\frac{9}{32}$	12× 15	$4\frac{3}{4}$ × $5\frac{7}{8}$	22	$8\frac{5}{8}$	£3 4 0
2	112	$4\frac{3}{8}$	9 5	$\frac{3}{8}$	13× 18	$5\frac{1}{8}$ × $7\frac{1}{8}$	28	11	£3 4 0
3	141	$5\frac{1}{2}$	12	$\frac{1}{2}$	16× 21	$6\frac{5}{16}$× $8\frac{1}{4}$	36	$14\frac{1}{4}$	£4 0 0
4	182	$7\frac{3}{16}$	14·5	$\frac{9}{16}$	20× 26	7 ×$10\frac{1}{4}$	40	$15\frac{3}{4}$	£5 0 0
5	212	$8\frac{3}{8}$	17 5	$\frac{11}{16}$	24× 30	$9\frac{1}{2}$ ×$11\frac{13}{16}$	54	$21\frac{1}{4}$	£6 0 0
6	265	$10\frac{1}{2}$	20 5	$\frac{13}{16}$	26× 35	$10\frac{1}{4}$×$13\frac{3}{4}$	68	$26\frac{3}{4}$	£7 10 0
7	315	$12\frac{3}{8}$	23 5	$\frac{15}{16}$	30× 40	$11\frac{3}{4}$×$15\frac{3}{4}$	80	$31\frac{1}{2}$	£9 0 0
					Reproductions of charts:		at 85°		
8	460	$18\frac{1}{8}$	26	1	30× 40	$11\frac{3}{4}$×$15\frac{3}{4}$	84	$33\frac{1}{8}$	£12 0 0
9	632	$24\frac{7}{8}$	35	$1\frac{3}{8}$	40× 50	$15\frac{3}{4}$×$19\frac{3}{4}$	116	$45\frac{3}{4}$	£17 10 0
10	947	$37\frac{1}{4}$	54	$2\frac{1}{8}$	50× 65	$19\frac{3}{4}$×$25\frac{1}{2}$	173	$68\frac{1}{4}$	£35 0 0
11	1310	$51\frac{5}{8}$	76	3	70× 86	$27\frac{1}{2}$×34	240	$94\frac{1}{2}$	£60 0 0
12	1660	$65\frac{1}{2}$	100	4	90×110	$35\frac{1}{2}$×$43\frac{1}{4}$	300	118	£100 0 0

The Anastigmatic Doublets are at present represented by three different types, corresponding to different requirements, which are distinguished from each other by their relative apertures and the effective working angle. In the list on pp. 12 to 17 they are placed under three heads, viz., series III., IV., V. The numbers I. and II. are kept in reserve for two other series of greater relative aperture.

In consequence of the peculiar system of correction for oblique pencils adopted in these lenses they behave somewhat differently from the usual types with regard to the mode of compensating the effect of the resulting aberrations between centre and margin of the field. This is, of course, only possible in the case of perfectly plane objects. In all other cases (landscape, instantaneous work or interiors) the centre should be focussed, and rather for objects at a distance than for near objects.

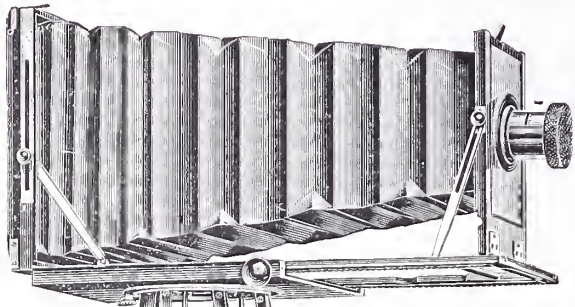
These lenses are patented in Germany, Great Britain, France, Austria, Hungary, Italy, Switzerland, and the United States.

ROSS & CO., Opticians, 112, New Bond Street, LONDON, W.

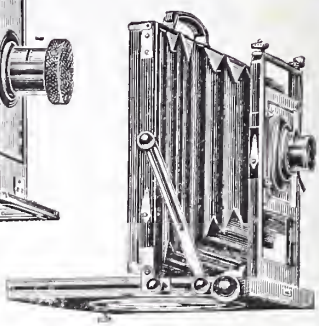
Manufactory—CLAPHAM COMMON.

ROSS' NEW

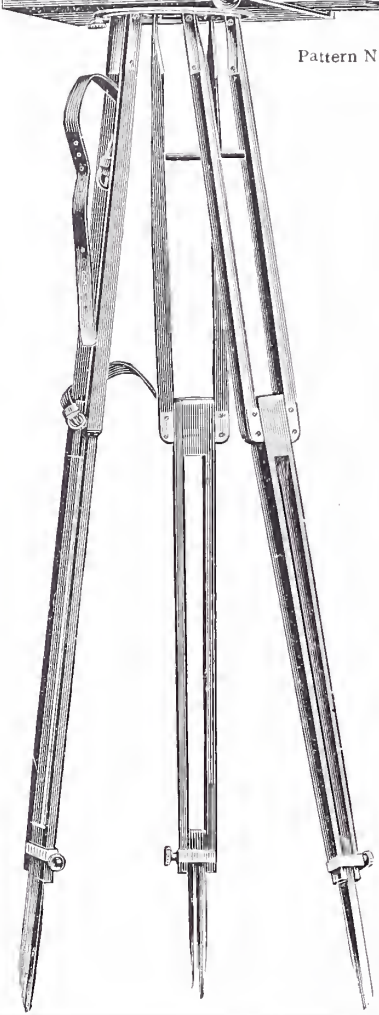
Improved Dry-plate Cameras.



Pattern No. 1.



Pattern No. 2.



EXTRA LIGHT AND PORTABLE

Double-extension CAMERAS,

For Lenses of Long Focus, with Swing Back, Reversible Holder, Turntable, and Legs.

Pattern No. 1 closes to the smallest substance consistent with stability, and is the most Portable Camera affording every desirable motion.

Pattern No. 2 closes like pattern No. 1, and being made for the new form of double backs is considerably LESS in its other dimensions. It is consequently the *Smallest* and *Lightest* Camera yet introduced.

SIZE.	PATTERN NO. 1.		PATTERN NO. 2.	
	With one Double Back.	With three Double Backs.	With one Double Back.	With three Double Backs.
$6\frac{1}{2}$x$4\frac{3}{4}$	£6 11 0	£8 15 0	£5 8 0	£7 4 0
$7\frac{1}{2}$x5	7 9 0	9 13 0	5 16 0	7 12 0
$8\frac{1}{2}$x$6\frac{1}{2}$	8 1 0	10 11 0	7 3 6	9 5 6
10 x8	9 1 0	12 5 0	8 14 0	11 6 0

Turntable and Legs, 37/6 extra.

Note.—Owing to differences in form of construction, and the small size and reduced cost of the new form of Double Backs, the prices of the No. 2 Pattern will compare favourably with any Camera of the same class.

Ten per cent. Discount when Remittance accompanies Order.

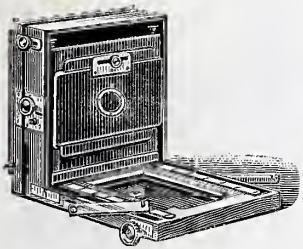
ROSS & CO., Opticians,

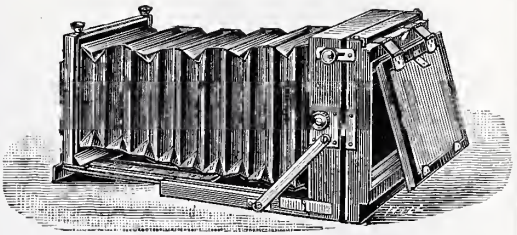
112, New Bond St., London, W.

Manufactory—CLAPHAM COMMON.

ROSS'

Improved Dry-plate Cameras.





Portable Double-extension Cameras,

For Lenses of Long Focus, with Double Swing Back, one Double Slide, and Extra Front. The 7½ x 5 size extends from 3 to 17½ inches.

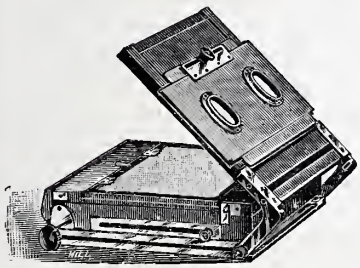
Size.	Price.	Highest Finish.	Square, with Reversible Holder. Price.	Highest Finish.	Brass Binding.
5 × 4	£4 15 6	£5 5 0	£5 8 0	£6 0 0	18s. each.
6½ × 4¾	5 14 6	6 7 0	6 8 0	7 2 0	20s. ,,
7½ × 5	5 19 0	6 12 0	6 12 6	7 10 0	20s. ,,
8½ × 6½	7 2 0	7 18 0	8 2 0	8 17 6	20s. ,,
10 × 8	8 5 6	9 4 0	9 10 0	10 10 0	25s. ,,
12 × 10	9 12 0	10 13 0	10 12 6	11 10 0	30s. ,,
15 × 12	11 18 6	13 5 0	13 5 6	14 15 0	40s. ,,

Division for Stereoscopic Views supplied with all 8½ x 6½ size and smaller Cameras, and with larger when desired.

Rack and Pinion Adjustment to Swing Back, 8½ x 6½ size and smaller, 5s. extra; larger, 10s. extra.

Portable Stereoscopic Cameras.

IMPROVED FORM.



PRICE.

Size.	With one Double Slide.	With three Double Slides.
6½ x 4¾ ..	£7 2 0 ..	£9 6 0
7½ x 5 ..	7 10 0 ..	9 14 0
8½ x 6½ ..	8 17 6 ..	11 7 6
10 x 8 ..	10 10 0 ..	13 14 0

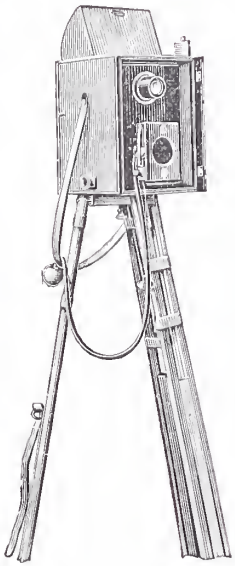
Symmetrical, Rapid Symmetrical, or Single Stereoscopic Lenses, accurately paired for use with the above Cameras.

ROSS & Co., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

NEW

PORTABLE DIVIDED CAMERA.



This Camera is specially recommended for both Stand and Hand Work. It is supported in a simple manner on the chest by means of a strap passing around the neck. It is also fitted with bush and thumbscrew for attaching to a tripod stand for either vertical or horizontal pictures. The illustration gives at a glance a general idea of its construction. The design is based on a modification of the Cameras, with full sized Finders, supplied for many years by Ross & Co., and shown by them at the principal Photographic Exhibitions (*vide* press reports). It is constructed throughout in the best possible manner of Spanish mahogany, and covered with stout sewn leather; the whole of the Camera and fittings being black renders it very unobtrusive in appearance. The instrument is divided into two compartments, each fitted with a Ross' Rapid Lens of identical focus. The lower chamber is the actual Camera, the upper portion acting as a View Meter and full-sized Finder. The image, when focussed on the ground glass (conveniently situated on the top of the instrument), is an exact counterpart of the picture formed by the lower lens on the sensitive film. Both Lenses are simultaneously adjusted by the milled head on the right side of the Camera, which works smoothly and quickly, so that objects in rapid motion, whether advancing or receding, are readily followed and sharply defined.

The under side of the flap, which forms the screen of the Finder, is fitted with a mirror to reflect the image to the operator's eye, when the Camera is raised to the ordinary height on a Stand. Each instrument is supplied with a specially designed light and compact Wollaston, or a Thornton-Pickard Blind Shutter, either form giving time and instantaneous exposures at will, but any other suitable make could be substituted at the difference in price.

The Twin Camera, for $4\frac{1}{4} \times 3\frac{1}{4}$ plates, measures $7\frac{1}{2} \times 5\frac{1}{2} \times 7\frac{1}{2}$. The lenses and shutter are protected by a leather-covered door, fitted with covered apertures for both lenses, to enable the operator, when desirable, to work without exposing the mechanism. The price includes either 3 Double Dark Slides, a changing box for 12 plates in sheaths, or an Eastman Roll Holder. The lenses supplied being accurately paired, and the form of the Camera lending itself readily to the adaptation, it could, at a small extra charge, be made convertible for Stereoscopic Photography.

PRICES, with a Thornton-Pickard Shutter:

For Plates	Outside Size.	Fitted with pair of Ross' Rapid Symmetrical Lenses.	Price.
$3\frac{1}{4} \times 3\frac{1}{4}$	6 x $4\frac{1}{2}$ x $7\frac{1}{4}$	4 x 3, $4\frac{1}{2}$in. focus ...	£16 16 0
$4\frac{1}{4} \times 3\frac{1}{4}$	$7\frac{1}{2}$ x $5\frac{1}{2}$ x $7\frac{1}{2}$	5 x 4, 6in. „ ...	18 18 0
5 x 4	8 x 6 x 8	6 x 5, $7\frac{1}{2}$in. „ ...	22 10 0
$6\frac{1}{2} \times 4\frac{3}{4}$	8 x 6 x 8	8 x 5, 9in. „ ...	24 10 0
$7\frac{1}{2} \times 5$	10 x 9 x $10\frac{3}{4}$	8 x 5, 9in. „ ...	26 10 0

The Wollaston Special Shutter, £3 3s. extra. Iris Diaphragms, from 10s. extra.
Double Swing Back, from £1 5s.

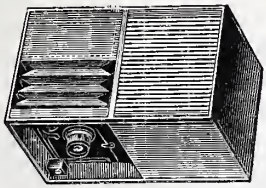
Ten per cent. discount for cash.

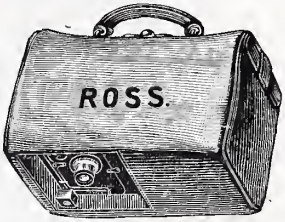
ROSS & CO., Opticians, 112, New Bond STREET, LONDON, W.

Manufactory - CLAPHAM COMMON.

ROSS'

New Patent Hand Camera.

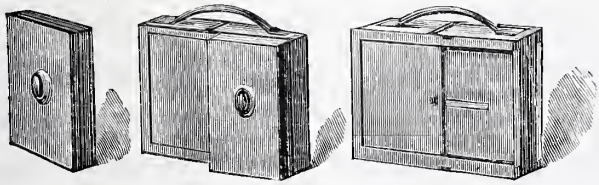




Prices, including Rapid Symmetrical Lens.

	£	s.	d.
Hand Camera, in stained black mahogany, for 24 plates, 4¼×3¼ ..	12	0	0
Detective form, in leather bag, 4¼×3¼	13	10	0
Hand Camera, for 24 plates, 5x4	13	0	0
Detective form, in leather bag, 5x4	15	0	0

Portable Collapsing Hand Camera.



PRICES.

	£	s.	d.
4¼×3¼ Camera, with 3 Double Dark Slides (6 Plates), Ross' Rapid Symmetrical Lens of about 4½" equiv. focus, and Time and Instantaneous Shutter..	7	7	0
5 x4 Ditto, with Lens of about 6" equiv. focus	8	8	0
4¼×3¼ Camera, with Magazine (14 Plates), instead of Dark Slides..	7	7	0
5 x4 Ditto, ditto ditto	8	8	0
Rigid Canvas Case to contain 4¼×3¼ Camera and 3 Slides	0	8	6

Universal Studio Cameras.

For Lenses of long focus, with repeating back and inner frames.

Size.	Size.	With Single Swing Back.	With Double Swing Back.	Brass. Binding.
6½× 6½ for Plates..	6½× 4¾ and under	£6 0 0 ..	£7 0 0 ..	£1 5 0
8½× 8½ ,, ..	8½× 6½ ,,	7 5 0 ..	8 5 0 ..	1 5 0
9 × 9 ,, ..	9 × 7 ,,	7 15 0 ..	8 15 0 ..	1 5 0
10 ×10 ,, ..	10 × 8 ,,	8 15 0 ..	9 15 0 ..	1 10 0
12 ×12 ,, ..	12 ×10 ,,	10 10 0 ..	11 15 0 ..	2 5 0
15 ×15 ,, ..	15 ×12 ,,	15 10 0 ..	17 10 0 ..	2 15 0

Rack Adjustment to Swing Back, from 10/- extra.

ROSS & CO., Opticians, 112, New Bond Street, LONDON, W.

Manufactory—CLAPHAM COMMON.

ROSS & CO.,

Manufacturing Opticians,

Contractors to Her Majesty's Governments, British and Colonial, also to the Principal Governments of Europe.

CATALOGUES

ON APPLICATION, OF

ROSS' MILITARY TELESCOPES.
ROSS' DEERSTALKING TELESCOPES.
ROSS' TOURIST TELESCOPES.
ROSS ASTRONOMICAL TELESCOPES.
ROSS' NAVAL TELESCOPES.
ROSS' SEXTANTS AND QUADRANTS.
ROSS' COMPASSES.
ROSS' SURVEYING INSTRUMENTS.
ROSS' PATENT MICROSCOPES.
ROSS' PATENT OBJECT GLASSES.
ROSS' MICROSCOPE APPARATUS.
ROSS' METEOROLOGICAL INSTRUMENTS.
ROSS' RACE AND FIELD GLASSES.
ROSS' OPERA GLASSES.
ROSS' MARINE AND NIGHT GLASSES.
ROSS' THERMOMETERS.

ROSS' SPECTACLES IN GOLD AND STEEL FRAMES.

(Manufactured on the Premises from the purest Optical Glass),

ETC., ETC., ETC.

112, NEW BOND STREET, LONDON, W.

Manufactory—CLAPHAM COMMON, LONDON, S.W.

SECTION IX.

INFORMATION OF USE TO AND CONCERNING THE PHOTOGRAPHIC TRADE.

OUR ILLUSTRATIONS.

THE pictures which form the subjects of our supplemental illustrations in the present volume have all been produced from photographs by one or the other of the various photo-mechanical processes which now form so large and important a branch of trade. They show side by side for ready comparison the work of the leading process houses, not only of this country, but of the Continent and America, and the world-wide progress of the art is thus practically illustrated. Generally speaking, the systems of reproducing photographs mechanically may be formed into two groups, which bear a similarity in their main characteristics to the letterpress and lithographic systems employed by the ordinary printer. In the first or half-tone block prccess the image is broken up into fine points or dots by interposing between the object photographed and the sensitive plate, when making the negative, a finely ruled screen plate—ruled in squares of from 90 to 120 lines to the inch. From the negative thus produced a print is made upon a prepared zinc plate, the surface of which is etched with dilute acid, and a printing surface thus formed, which when mounted type-high on a wood block, can be printed on an ordinary printing machine along with type in the same way as an ordinary engraved block. In the other system—the photo-collographic or collotype—the pictures must, as in lithography, be printed separately, and concerning this system Messrs. S. B. Bolas and Co., of 11, Ludgate Hill, E.C., who, amongst others, work this system, say: — Photo-collography is, without exception among all known processes, that which renders the most valuable services to art and industry. It is the only one which, thanks to the numerous improvements introduced, is capable of producing at a comparatively inconsiderable cost those hundreds of thousands of illustrations required by the various journals, as well as the reproductions so necessary to large engineering works as they are to small manufacturers. It is the only process capable of producing with undeniable perfection the extremely delicate semi-tones of negatives; and the only one besides which will admit of printing with perfect ease in the ordinary way on machines driven by steam. To say that photo-collography is a matter of great ease would be misleading, for in order to ensure complete success the operator must be an adept in photography first, and an efficient printer in the second place.

Negatives must bear a special character, and be of absolute good quality; that is the first condition. A common or inferior negative will yield only inferior or bad impressions, as will be readily understood. The negative moreover must be reversed, that is to say, it must present the image in the natural position of the object represented. This is obtained in various ways to which we shall here briefly allude.

The simplest method of obtaining such negatives consists in the use of a prism applied to the object glass, or inserted between the lenses that constitute it. With such an arrangement nothing further is needed but to lay, develop, and fix as usual on a gelatino-bromide plate. Another plan for obtaining reversed negatives consists in employing Eastman films. As the layer is of extreme tenuity, the impression by light can be executed on the film side without appreciable loss of fineness. Gelatino-bromide plates can be used as specially made for this purpose, and the layer or film of which is detachable. The negative is produced upon these plates in the usual way, dried, and covered with a layer of glycero-gelatine. When dried, the whole layer or film is lifted off the glass. It is imperative to treat all such *clichés* with a strong solution of alum, after fixing. Many other operators use pyro-ammonia to develop their *clichés* with, but this plan must be altogether eschewed for negatives required for purposes of photo-collography. The best developers are pyro-sulphite and hydroquinone. As before stated, negatives must be of good quality, that is to say, accurately detailed and moulded in all their parts, and perfectly free from hardness. A slight excess of exposure is advisable. A negative in which the dark parts are highly transparent will not yield good results. In a word, as is the negative so will the impression be.

Among all the various photographic processes, the best negatives for the purpose of photo-collography are yielded by the old wet collodion process. *Clichés* thus obtained give the very best results.

AGAINST THE SKY.

Mr. Bernard Alfieri has of late years attained a just reputation for artistic work in connection with photography, and "Against the Sky" is one of those daring dealings with the light which our artistic photographers are fond of indulging in, and with which, when successful, they secure such brilliant results. As a picture, this study leaves very little to be desired. The sheep, especially those on the left of the horse, are admirable. All the lines of the picture run to the principal object, and in every way it is possessed of great pictorial effect. Mr. Alfieri obtained a medal at Cardiff for this picture, concerning which the *Art Journal* says: "It is rather curious to imagine the artists who work with living materials, following out the facts of the landscape, in the hope that they may fortuitously combine according to art;" and further, "so much is Mr. Alfieri's work like a picture, that we have more than once been on the point of praising the drawing of his horse, and the way in which the disappearing sheep are made to express the dipping away of the sea wall edge." The picture has been reproduced for us by the Graphotone Co., Bush Hill Park, Enfield. The firm has recently commenced the working of the Graphotone printing process—in other words, collotype—and in this picture, at least, they show us as good results as it is possible to wish for.

EASHING BRIDGE AND A KENTISH LANE.

Through the instrumentality of Mr. J. R. Gotz, of 19, Buckingham Street, Strand, we are enabled to present to our readers specimens of the collotype work of the Continent, namely, that of MM. F. Thevoz & Co., of Geneva. There is a great deal of beauty in these reproductions. The half tones are exceedingly well rendered, and the shadows, too, are relieved from much of that dense sootiness which so frequently spoils collotype work. Those interested in the photo-mechanical work of the world, now have an opportunity of comparing the work of a leading foreign house with that of our best English collotype workers. Only one of the above pictures appears in each issue.

THE SILVER STRAND, LOCH KATRINE.

This picture, from a negative by Mr. J. MacCallum, is a specimen of the Graphotone (collotype) process by the Graphotone Co., of Bush Hill Park, Enfield. The place depicted, is perhaps, one of the best known to tourists in the north, and in the reproduction we have that undefinable haze over the distance, which adds so much to the characteristic beauty of scenes like this, secured with marvellous effect.

IFFLEY MILL ON THE THAMES AND MEDMENHAM ABBEY.

Messrs. Waterlow and Sons, of Finsbury Stationery Works, London, one of the first firms in this country to enter largely into photo-mechanical work in collotype reproduction of photographs, have devoted much capital to the laying down of plant for doing this class of work by machine printing. The collotype process might be compared with the half-tone etching process, by saying that it bears a greater resemblance to lithographic work than it does to letter-press printing. In collotype work the especial aim in producing the negative is to get softness with plenty of detail rather than hardness, as the great tendency is to clog the shadows and intensify the high lights. Messrs. Waterlow, with the experience they have now had, rank amongst the leading English houses in this branch of work.

THE INTERNATIONAL PHOTOGRAPHIC CHART OF THE STARS.

This is a reproduction, reduced one-third, from a negative of the cluster 7 Messier, taken with the 13in. photographic charting telescope on September 17th, 1890, by Dr. Gill, at the Cape of Good Hope. The exposure given was 25 minutes, the sky being clear, but a heavy south-easter was blowing; the images of the stars were excessively diffused and unsteady, and no ordinary visual observations could be made. The lines of the *réseau* are necessarily very fine on the original, and are nearly lost in the reproduction, but it will be easily seen how the positions of the stars on the plate can be fixed by measuring their distances from these lines, and the distor-

tions of film corrected without difficulty. The stars range in magnitude from α Cygni of the first magnitude probably down to the 16th. The faintest stars shown are beyond the range of the largest telescope in the world for visual work, and only the cumulative effect of long exposures enables the existence of these stars to be clearly demonstrated. It is only by such photographs as these that any true idea can be formed of the actual constitution of the Milky Way.

PHOTOGRAPH OF THE MILKY WAY IN THE REGION OF α CYGNI.

This is a reproduction reduced about one-third from a photograph taken with a Kranz-Euryscope lens of 5¼ inches aperture, with an exposure of 13 hours 5 minutes. To get this long exposure the plan originally suggested by Dr. Common was used. On September 9th, 1891, the plate was exposed for as long a time as possible, then the dark slide was closed, and the apparatus left until next night. On September 10th, the same guide star was picked up in the watching telescope, the dark slide was opened, and the exposure continued. The original shows a large amount of nebula which is lost in the reproduction, as are many of the faint stars, but in many cases the thin threads of nebulous matter connecting many stars together can easily be traced.

PHOTOGRAPH OF THE MILKY WAY IN THE REGION OF β CYGNI.

This is a reproduction reduced about one-third, from a photograph taken with a Kranz-Euryscope lens of 5¼ inches aperture, with an exposure of 12 hours, 6 minutes. In this case the exposure was spread over three nights, September 25, 29, and 30, 1891, in exactly the same manner as the photograph of the α Cygni region was taken on September 9 and 10, 1891. Just as in the other case α Cygni occupies the centre of the plate, so in this case β Cygni is the brightest star, and is near the centre.

PHOTOGRAPH OF A METEORITE.

This is a reproduction, four times enlarged, of a portion of a photograph of the region of the great nebula in Cygnus, taken on the evening of September 7, 1891, by Dr. Max Wolf, at Heidelberg. The time of exposure was one hour, from 14 hours 21 minutes to 15 hours 21 minutes, Heidelberg mean time, the instrument used being a 2⅔ portrait lens. The line forming the trace of the meteorite shows considerable fluctuations in intensity, which agree with those shown on another photograph of the same meteorite taken at the same time with a 5¼ inch Kranz lens. Unfortunately, the whole of the trace is not shown on the photograph with the larger lens. A considerable number of stars are lost in the reproduction, but the path of the meteorite can be clearly made out.



From a photograph by Gunn & Stewart, Richmond

PRINCESS MAY.

Photo-etched by Buchan & Leslie, 101, Leadenhall Street, London

MISS MISCHIEF.

It has been our custom in the conduct of *Photography* to inaugurate quarterly competitions for different branches of photographic work. The last competition, which was held in 1891, was one for portraits, and resulted in 82 prints being sent in by 54 competitors. As usual with *Photography* competitions no distinction between amateurs and professionals was made. In the result Mr. J. Jenkins, of Fernbank, Gloucester, an amateur of but a comparatively brief experience—who has, however, previously shown good work and secured medals at Cardiff and Leeds—was awarded the silver medal for the portrait study which forms the subject of our picture. Of this production, which was printed on Blanchard's platinum paper, Mr. F. M. Sutcliffe, who adjudicated on the prints, says: "We have no compunction in placing 'Miss Mischief' and 'Our Polly' (another print by the same competitor), two portraits taken down to the waist without accessories of any kind, before them all, for these would never tire us, and if they are not capital likenesses we are very much mistaken. Even without the explanatory title it is easy to see that the little girl in the cotton bonnet is a practical joker of the most desirable type; the merry twinkle in her eye shows that her presence is like a ray of sunshine, and that the mischief she is for ever planning will make life worth living for many a one. In both the portraits the range of tones is wonderful; they are in every respect as technically perfect as they are delightfully simple and beautiful." Our reproduction of the picture is from a half-tone block by the well-known Vienna firm.

BUCKSKIN BILL.

This picture, the work of Mr. W. T. Briggs, of Birkenhead, secured the bronze medal in the *Photography* portrait competition, which closed 31st December, 1891. The original is on a 20 × 18 plate, and of it Mr. Frank M. Sutcliffe, who undertook the judging, remarks:—"One of our best portraitists told us the other day that any duffer could take a small portrait, but that very few duffers could tackle a large one, and at first sight Buckskin Bill's portrait of himself pushed all the rest of the competition portraits on one side by its unquestionable boldness. But for that, a life-size head in a slouch hat would never have prevailed upon us to give it a place, had it not possessed other good and desirable qualities—good modelled features, due to clever lighting, background in harmony with the rest of the portrait, and technical excellence that no duffer can hope to attain, make a portrait well worth the bronze medal. The reproduction is a half-tone process block by Messrs. Angerer and Goschl, of Vienna.

MY NEW PINAFORE.

The *Photography* competition which closed on the 31st March, 1892, was for enlargements. The judging was placed in the hands of Mr. F. A. Bridge and Mr. H. M. Hastings, with full power to deal with the awards as they pleased. Finding a not unnatural difficulty of comparing such diverse subjects as landscapes, architectural work, and portraits, they dealt with the former on one basis, and with the latter separately, giving a special silver medal for the

portraits to a picture entitled "My New Pinafore," sent in by "Bulstrode." This proves to be Mr. Robert Frost, a professional photographer of Loughboro', and our reproduction shows the subject. The enlargement measured about 18×14, and was a good average example of what professional enlarging work should be. The picture has been reproduced for us by the half-tone process of Messrs. John Swain & Sons, 58, Farringdon Street, London, who are one of the largest zinc-etchers, wood engravers, and block-producers by various methods in the world.

PHOTOGRAPHY.

Here is a novelty in the way of fancy dresses for fancy dress balls. The history of the photograph is as follows:—During the past winter, children's fancy dress balls have been very popular in Coventry. To one of these the editor of *The Midland Daily Telegraph*, one of Messrs. Iliffe & Son's publications, sent his daughter dressed as *The Midland Daily Telegraph*. The idea then occurred to Mr. F. Lupson, one of the leading professional photographers of the city, that if *The Midland Daily Telegraph* could be represented, why not *Photography*, and in what better character could the daughter of a photographer appear? We were very willing of course to second his efforts, and as our issue of February 25th was then about to go on the machine, he brought the white material for the dress in to our printers to run it through the machine, printing it both from the matter and advertisement formes. In the making-up, as may be seen by the reproduction, the advertisement sheets are made to form the front of the dress, the matter appearing on the back. The jacket represents a black velvet focussing cloth thrown over the shoulders, and the hat of non actinic ruby red is the photographer's light, and with the editorial stylus stuck jauntily on one side, the costume is complete. Of course such an original get up could not be allowed to pass without a photograph, and, fitted out with one of King's hand cameras, the little maiden was taken by her father in the attitude we represent, the reproduction of the photograph being executed by the Meisenbach Co., of London, who do so large a British trade in half tone engraving.

RECKONING IT OUT.

The old lady in the picture, with her volume in front of her, is supposed to be calculating the time which must elapse to the next festival in which she is interested. The picture is an American one, and its method of reproduction is the half-tone process block system of the Crosscup and West Engraving Co., of Philadelphia. The firm is one of the best known process houses in the States, and the specimen which we now publish is as fine a specimen of half-tone work as we have seen for a long time. The general system adopted is that known as Ives zinc-etching process, which is very similar to that of the Meisenbach Co., in this country. The photo is taken through a finely ruled screen plate and printed on a prepared zinc plate, which is then etched, the fine screen breaking up the picture into minute dots. The manufacture of screen plates has been brought to great perfection in America, and the fineness of the screen produces the extremely fine grain, which results in the smoothness of the picture.

A SUMMER IDYL.

The darkie in the melon patch is as typical of American country life as the small boy in the orchard at home. The dusky races of America appear to revel in the luscious fruit, and Mr. Burgraf, of Johnstown, Pa., has, by the aid of a melon, an old cask, and a couple of nigger boys, produced a typical picture. The only drawback is that its background proclaims it to be plainly a studio production. Our reproduction is a specimen of the autoglyphic work of the Levytype Co., of Philadelphia, a firm which occupies a high position amongst the producers of half-tone type blocks in the States.

AN INTERESTED SITTER.

A few months since Mr. A. Swan Watson, of the View Park Photo Art Studios, Bruntsfield Links, Edinburgh, sent us a specimen of his portrait work, a platinum print, of which this is a reproduction. At that time Messrs. Angerer & Goschl, of Vienna, being desirous to show a specimen of their half-tone zinc etching process work in the ANNUAL, we thought we could not do better than allow them to reproduce it, with Mr. Watson's permission, for the edification and instruction of our readers, who are thus introduced at the same time to some of the finest Continental work in process engraving, as well as to a specimen of what good commercial portrait photography should be. We have very little hesitation in saying that if all our professional readers produced portraits in the style and character of the example shown they would have no difficulty in getting good prices for their work and plenty of patronage.

NORDFJORD VED VASENDEN I LOEN.

Who has not heard of the charms of Norwegian scenery and the special attraction it offers to the photographer? Personal experience leads us to emphasise all that has been said on this point, and to advise our readers, if they can spare the time and the needful, to take a trip to the "Land of the Midnight Sun" as it is so picturesquely termed. The scenery is truly magnificent as well as beautiful, and the picture which we reproduce is a thoroughly characteristic piece of Norwegian scenery. It is a sample of half-tone photo engraving by Messrs. A. Wood & Son, 6, St. Bernard's Row, Edinburgh, who are, we believe, the only firm in the Scotch capital undertaking process engraving. Tho result certainly shows them to have thoroughly mastered the technique of their art, and we are able to congratulate them upon securing so good a result.

WAITING FOR THE TIDE.

Readers of *Photography* and the ANNUAL are, we know, always interested in hand camera work. The picture which we now present is a reproduction of a photograph taken in the "Facile" hand camera, one of the simplest and easiest instruments to work in the market. The reproduction is an ordinary half-tone process block by Angerer & Goschl, of Vienna, taken from a silver print.

THE PRINCESS MAY.

In this illustration we have an example of the half-tone zinc etching of Messrs. Buchan & Leslie, 102, Leadenhall Street, London, who are amongst the later competitors in this branch of trade. The subject is one which will commend itself to all who are Englishmen, the Princess May having been so very much in people's thoughts and hearts of late. We think that both as an example of the work of one of the newer houses, and also as a popular portrait, this illustration will prove by no means the least interesting in the book.

A GROUP OF CHILDREN.

In our last year's ANNUAL we reproduced Mr. Shapoor N. Bhedwar's silver cup picture by a then entirely new process, the picture being really the first which had publicly appeared. This process was the invention of Mr. Henry Sutton, of Melbourne, and differed very materially in the principle of its working from the ordinary half-tone zinc etching processes now used so generally amongst photo engravers. The Sutton process is exceedingly simple. A negative is taken on a specially-prepared and very thickly-coated plate, the image being projected upon it through a finely-ruled screen plate. This splits the image up into the requisite dots or grains in the same manner as the zinc etching process, up to which point the procedure is identical. At this point, however, a divergence takes place in the methods. The negative is very lightly developed, and when fixed is surface-dried with blotting paper and then placed on the top of a small oil stove and dried by heat—the special preparation of the gelatine of which the plate is made permitting this—the action of drying in this manner forcing the grain very considerably into prominence. When dried the negative is placed in a frame, rubbed over with blacklead, and placed in an electrotyping bath for a few hours until it is thoroughly coated with a thin covering of copper. The glass is then removed, and the gelatine washed away from what is now the face of the future block. The electrotype thus formed is next mounted in the usual way in which electrotypes are treated, and the block is ready for printing. A comparison of the block reproduced in the present volume, with that given in our last, will show that very great strides have been made in the process during the past 12 months, the depth of the grain now obtainable being very much more than in the earlier specimens. A syndicate has been formed to work the process, which body is now prepared to issue licences for the working of it.

ISOCHROMATIC RENDERING OF COLOURS.

The three plates which illustrate Mr. F. Parsons's article on Isochromatism, are printed from half-tone zinc-etched blocks prepared by the Meisenbach Co., from photographs by Mr. Parsons. Plates 1 and 2 are reproductions taken by permission of the publishers, Messrs. Cassell & Co , Ltd., from the plates given in Prof. Church's "Colour," price 3/6.

EASTMAN'S

TRANSPARENT (NON-STRIPPING)

FOR ROLL-HOLDERS FLEXIBLE FILMS

A GREAT DISCOVERY.

TO THE PHOTOGRAPHIC PUBLIC.

IT affords this Company great satisfaction to be able to announce, as the outcome of a series of experiments extending over a number of years, the discovery of a FLEXIBLE TRANSPARENT SENSITIVE FILM, capable of being made in rolls for use in Roll-holders and Kodak Cameras.

The backing of this new Film is impervious to water, and unaffected by chemicals used in development.

As Thin and Flexible as Paper and Transparent as Glass.

It is developed the same as a glass plate, and requires No STRIPPING.

The process by which this new film is made, has been worked out by the aid of an extended experience in making both glass and paper dry plates, and we can safely say that all the difficulties in both manufactures have been avoided in the new film, thus enabling us to present a material for negative-making that has never before been approached either in uniformity or general freedom from defects. The emulsion used is of extra rapidity.

Our new factories have been equipped for this special work, and preparations are completed for manufacturing upon an extensive scale.

Patents have been applied for in all countries to cover both the new article of manufacture and the process of manufacture.

The proper way to expose this film is with a roll-holder. The merits of the roll-holder are too well-known to need enumeration here, and now that a film has been perfected that is as simple to manipulate as glass, and as light and flexible as paper, the out-door photographer will find *a roll-holder a necessity.*

Roll-holders can be fitted to almost any camera; but as some patterns are better adapted to receive them than others, purchasers of new instruments should always bear this point in mind in making a selection.

SEND FOR PRICE LIST.

The EASTMAN PHOTOGRAPHIC MATERIALS CO., LTD.

115, OXFORD STREET, LONDON, W.

PARIS:
4, PLACE VENDÔME.

NICE:
PLACE GRIMALDI.

ROCHESTER, NEW YORK, U.S.A.:
THE EASTMAN KODAK CO.

[See following pages.

EASTMAN'S
EXTRA RAPID BROMIDE PAPER.

WE have pleasure in announcing that, in compliance with the request of a large number of our friends, we are now manufacturing a new brand of Bromide Paper to be known as EASTMAN'S EXTRA RAPID BROMIDE PAPER. This Paper is very Rapid, and gives very soft and beautiful results.

The sizes and prices of this paper are annexed.

The prices of Eastman's "Permanent" Bromide Paper remain as heretofore.

A B or C.

CUT SHEETS.

TWELVE IN EACH PACKET.

Size. Inches.	Permanent. s.	Permanent. d.	Extra Rapid. s.	Extra Rapid. d.
4¼ × 3¼	0	8	0	6
5 × 4	0	11	0	9
6½ × 4¾	1	6	1	1
7½ × 5	1	8	1	4
8½ × 6½	2	6	1	11
10 × 8	3	6	2	9
12 × 10	5	0	4	2
12½ × 10½	5	6	4	6
15½ × 12½	7	6	6	9
23 × 17	14	0	13	6
25 × 21	21	0	18	3
30 × 25	28	6	26	1
40 × 30	46	6	41	8

CONTINENTAL SIZES.

Centimetres.	Permanent. s.	Permanent. d.	Extra Rapid. s.	Extra Rapid. d.
9 × 12	0	10	0	8
13 × 18	1	8	1	3
18 × 24	3	0	2	4
21 × 27	3	9	3	0

All sizes larger than, and inclusive of, 15½ × 12½ are made up in packets of **SIX sheets, if desired.**

25 FEET ROLLS.

	Permanent. Per Roll. s.	Permanent. Per Roll. d.	Extra Rapid. Per Roll. s.	Extra Rapid. Per Roll. d.
12 inches in width	11	10	10	5
18 ,, ,,	17	4	15	8
25 ,, ,,	24	4	21	8
30 ,, ,,	29	2	26	0
40 ,, ,,	38	10	34	9

THE EASTMAN PHOTOGRAPHIC MATERIALS CO., LTD.,

115, OXFORD STREET, LONDON, W.

PARIS:
4, PLACE VENDÔME.

NICE:
PLACE GRIMALDI.

ROCHESTER, NEW YORK, U.S.A.:
THE EASTMAN KODAK CO.

(See preceding and following pages.

EASTMAN'S

PERMANENT

BROMIDE PAPER

FOR ENLARGING, COPYING PLANS, AND DIRECT CONTACT PRINTING FROM NEGATIVES.

THIS paper has now been extensively sold in all parts of the world for a period of five years. The criticism of interested parties against its permanency has been proved utterly unfounded; in fact, it is the only photographic paper which has successfully withstood extreme tests intended to injure images produced upon it.

No finer effects have ever been produced upon any photographic paper than are now secured upon Eastman's, and without doubt its introduction has caused a marked change in the public taste in favour of the steel-grey or blue engraving black tone.

This paper is uniformly and heavily coated by machinery with Silver Bromide mixed with the least possible quantity of gelatine to avoid curling and to preserve the tooth of the paper for working with crayons, and is made in three grades, viz.: A, B, C.

Pure Blacks and Whites can be obtained with this paper from suitable negatives. As with albumenized paper, the tone depends somewhat upon the character of the negative. From good original negatives, enlargements may be obtained with this paper that require no finishing, and superior to albumen prints on account of their permanence.

SPECIALLY RECOMMENDED FOR EXPORT.

PERFECTLY COATED.
IN RANGE OF SHADE UNEQUALLED.
UNIFORM. PERMANENT.

FOR PRICES SEE PAGE 2.

THE EASTMAN PHOTOGRAPHIC MATERIALS CO., LTD.,
115, OXFORD STREET, LONDON, W.

PARIS:
4, PLACE VENDÔME.

NICE:
PLACE GRIMALDI.

ROCHESTER, NEW YORK, U.S.A.:
THE EASTMAN KODAK CO.

[See preceding and following pages.

Eastman's Roll Holder,

Model of 1888.

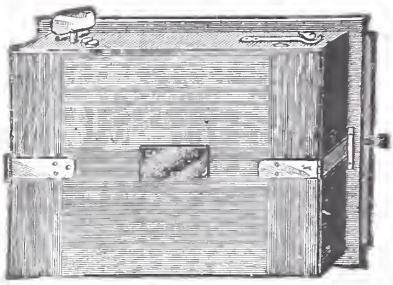
SEND FOR REDUCED PRICES.

PROBABLY no invention connected with photography has met with such favour as this Roll Holder, and to its perfect design and construction may be attributed, in a large manner, the immediate success of film photography; for, when it be considered that a Roll Holder, containing a film for forty-eight exposures, occupies no more space than three ordinary dark slides and weighs greatly less than the slides loaded with glass, any thoughtful photographer will at least investigate the subject before purchasing his outfit.

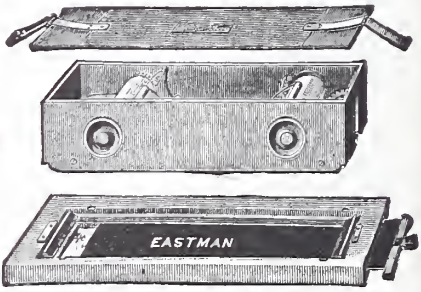
The Eastman system is entirely dissimilar from all others, inasmuch as it first provides for the insertion of the unexposed film, **already wound upon a spool or core, which fits the Roll Holder Mechanism.** During the passage of the film through the instrument it is accurately marked by an automatic device designating the limits of the several exposures; an indicator shows distinctly when the film is in position for exposure, and the operator's attention is simultaneously arrested by the action of an audible alarum.

One of the most important features of this Roll Holder is the maintaining of the film under definite tension during any atmospheric changes; this is the only instrument having such a device.

All instruments are made of best polished mahogany, and can be easily fitted to any existing camera.



No. 1.



No. 2.

No. 1 represents the complete instrument, showing the winding key at the upper left-hand, and the indicator and audible alarum at the upper right-hand side.

No. 2 represents the instrument divided into three parts, the upper portion being the back removed from the central portion or case, in which is seen the rolls or spools of film in position. The lower part is the front, which is left larger in all directions to permit of fitting to the camera back. This work can be easily done by an intelligent camera maker; but when it is possible we prefer to do it ourselves, for which we charge cost price only, in which case we always require the reversing frame or camera itself.

NO HAND CAMERA IS COMPLETE WITHOUT ONE.

THE EASTMAN PHOTOGRAPHIC MATERIALS CO., LTD.,

115, OXFORD STREET, LONDON, W.

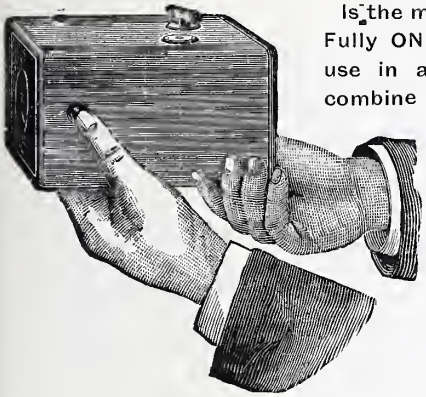
PARIS:
4, Place Vendôme.

NICE:
Place Grimaldi.

Rochester, New York, U.S.A.:
THE EASTMAN KODAK CO.

(*See preceding and following pages.*

THE 'KODAK'



Is the most popular Camera ever made. Fully ONE HUNDRED THOUSAND are in use in all parts of the World. They combine the best requisites, compactness, enormous capacity, and simplicity of manipulation.

They bear the same relation to an ordinary Camera as the modern repeating breech-loading rifle has to the old-fashioned muzzle-loading musket.

EIGHT SIZES.

			Capacity.		
No. 1.	No longer made.				
No. 2.	3½in. ..	Round Picture	100 Exposures.		£7 0 0
No. 3. Reg. ..	3¼ × 4¼in.	Rectangular Picture	100 Exposures	..	8 7 6
*No. 3. Junior	,,	,, ,,	60 ,,	..	8 7 6
No. 4. Reg. ..	4 × 5in.	,, ,,	100 ,,	..	10 7 6
No. 4. Junior	,,	,, ,,	48 ,,	..	10 7 6
*No. 4. Folding	,,	,, ,,	48 ,,	..	11 7 6
*No. 5. ,,	5 × 7in.	,, ,,	48 ,,	..	13 7 6

PRICES OF GLASS PLATE ATTACHMENTS.

* Sizes marked with an asterisk are now supplied with a **Glass Plate Attachment,** and three double dark slides. These attachment Outfits consist of three double dark slides, focussing screen, adapter, leather carrying case and shoulder strap.

No. 3 Junior	..	£2 2 6	No. 4 Folding	..	£1 13 0
			No. 5 Folding	..	1 19 6

No Traveller, Architect, Artist, or Engineer should be without one. Send for the "*KODAK PRIMER*," an Illustrated Pamphlet describing the Series. Post free.

For the NEW A B C KODAKS see page 722.

THE EASTMAN PHOTOGRAPHIC MATERIALS CO., LTD.,

115, OXFORD STREET, LONDON, W.

PARIS:
4, PLACE VENDÔME.

NICE:
PLACE GRIMALDI.

ROCHESTER, NEW YORK, U.S.A.:
THE EASTMAN KODAK CO.

[*See preceding pages.*

A B C KODAKS

THE **A B C KODAKS** are designed especially for a very large and increasing number of Amateurs, who do not care to purchase an expensive instrument. The letters **A B C** refer primarily to sizes, but they may be taken in another sense to indicate the great value of these instruments for beginners; they are extremely simple in construction, and will supply a want long felt for a really well-made Camera of great capacity, enabling the beginner to commence at the A B C of Photography, and produce good results.

PRICE LIST.

	A. Size of negative in inches. $2\frac{3}{4}\times3\frac{1}{4}$	B. $3\frac{1}{2}\times4$	C. 4×5
"Daylight" style, covered with black leather and fitted for spools to *reload in daylight*	£1 16 0	£3 5 0	£5 5 0
"Ordinary" style, finished in natural wood	1 6 0	2 2 0	3 5 0

All the above Kodaks are loaded with spools for 24 exposures.

The "A Daylight" has single lens, fixed stop, and requires no focussing.
" "B " has double lens, revolving stops, and view finder.
" "C " has double lens, revolving stops, adjustable speed to shutter, 2 view finders, and focussing lever and index.

The "A Ordinary" has single lens, fixed stop, and requires no focussing.
" "B " has single lens, revolving stops, and view finder.
" "C " has single lens, revolving stops, adjustable speed to shutter, 2 view finders, and focussing lever and index.

All the above Kodaks are supplied with *Manuals of Instruction* gratis, and are fitted with our patented automatic locking and registering device, which effectually prevents overwinding of the film, and records the number of exposures made.

GLASS DRY PLATE ATTACHMENTS.

Can be supplied only with the C Kodaks.

Glass Plate Attachment for the **"Daylight"** style	£1 1 0
" " " " **"Ordinary"** style	17 0
Double backs for glass plates, each	5 0

The Eastman Photographic Materials Co., Ltd.

115, OXFORD STREET, LONDON, W.

PARIS:
4, PLACE VENDÔME.

NICE:
PLACE GRIMALDI.

ROCHESTER, NEW YORK, U.S.A.:
THE EASTMAN KODAK CO.

Directory to Registered Telegraphic Addresses & Telephone Numbers.

The utmost care has been taken to ensure the accuracy of the information contained in the following pages, which we have no hesitation in saying will be found the most complete and accurate of its kind yet published.

Name	Postal Address.	Telegraphic Address.	Telephone Number.
Adams & Co.	81, Aldersgate, E.C.	"Pyro, London"	—
Adams & Co.	26, Charing Cross Road, W.C.	"Snaphanc, London"	—
Albion Albumenising Co.	96, Bath Street, Glasgow	"Albumen, Glasgow"	—
Americo-European Trading Co, Ltd	72, London Wall, E.C.	"Finality, London"	—
Amphlett, Humphreys & Co.	88, Brixton Hill, S.W.	"Photogen, London"	9,138
Anthony, E. & H. T. & Co.	591, Broadway, New York	"Tyvalvate, New York"	—
Appleton, R. J. & Co.	58, Manningham Lane, and 11, Leeds Road, Bradford	"Optical, Bradford"	1,559
Arundel & Marshall	Penn Street Works, Hoxton, London	"Archway, London"	220
Atkinson, John J.	37, Manchester Street, Liverpool	"Perfection, Liverpool"	—
Beck, R. & J.	68, Cornhill, London	"Objective, London"	1,161
Benham & Froud, Ltd.	Chandos Street, London, W.C.	"Benfro, London"	—
Birmingham Photographic Co., Ltd.	99 and 100, Gladstone Road, Sparkbrook, Birmingham	"Kallitype, Birmingham"	—
Blackfriars Photographic and Sensitising Co., The	1, Surrey Row, London, S.E.	"Mounts, London"	2,514
Bolas, S. B. & Co.	11, Ludgate Hill, London, E.C.	"Bolastype, London"	—
Bolton & Sons	47, West Nile Street, Glasgow	"Gresham, Glasgow"	—
Bonne & Co.	57 and 58, Chancery Lane, E.C.	"Bonnement, London"	—
Brighton Photo Enlarging Co.	West Street, Brighton	"Enlargements, Brighton"	—
Brin's Oxygen Co., Ltd.	34, Victoria Street, Westminster, S.W.	"Brin's Oxygen, London"	3,111

Name.	Postal Address.	Telegraphic Address.	Telephone Number.
Britannia Works Co., The	Ilford, London, E.	"Plates, Ilford"	5,216
Brown, Scott & Co	254, High Holborn, W.C.	"Punctual, London".. ..	—
Camera Club	Charing Cross Road, W.C.	"Monochrome, London" ..	35,056
Carson, Walter & Sons	Grove Works, Battersea, S.W.	"Carsons, London"	9,069
Cartwright & Rattray, Ltd. ..	64, Fountain Street, Manchester	"Cartwright Rattray, Manchester"	—
Chadburn & Son	11, Waterloo Road, Liverpool	"Chadburn, Liverpool" ..	826
Chadwick, W. I.	2, St. Mary's Street, Manchester	"Stereo, Manchester" ..	—
Chapman, Josiah Thos.	Albert Square, Manchester	"Camera, Manchester" ..	—
Clarkson, A.	28, Bartlett's Buildings, Holborn Circus, E.C.	"Equatorial, London" ..	—
Crane Chemical Co., The Fredk..	22, Newhall Hill, Birmingham	"Chemical, Birmingham" ..	—
Dallmeyer, J. H.	25, Newman Street, London, W.	"Dallmeyer, London" ..	—
De Saulles, S. & G. & Co.	52 and 54, Spencer Street, Birmingham ..	"Desaulles, Birmingham"..	—
Di Luggo, Dennis & Co.	7 and 8, Idol Lane, London, E.C.	"Diluggo, London"	—
Dixon, L. S. & Co.	79, School Lane, Liverpool	"Paper, Liverpool"	1,037
Eastman Photographic Materials Co., Ltd., The .. .	115, Oxford Street, London, W...	"Kodak, London" and "Eastman, Harrow" (for factory) ..	—
Edwards, B. J. & Co.	The Grove, Hackney, London	"Excel, London"	—
Elliott & Son	Park Road, Barnet, Herts	"Elliott, Barnet"	
Ellis, Alfred	20, Upper Baker Street, N.W.	.. ..	7,162
England, J. Desiré	22 to 25, Charles Street, Notting Hill, London	"England, London"	—
Ernst, Carl & Co.	Köpnickerstr. 112, Berlin	"Visitcards, Berlin" ..	—
Fallowfield, Jonathan	Central Photographic Stores, 146, Charing Cross Road, W.	"Fallowfield, London" ..	-
Fell, John & Co.	Wolverhampton	"Fell, Wolverhampton" ..	—
Forrest, J. A. & Son	1 and 3, Mount Pleasant, Liverpool	"Negative, Liverpool" ..	1,115
Franks, A.	95, Deansgate, Manchester	.. ..	4,222 & 4,224
Fry Manufacturing Co.	5, Chandos Street, Charing Cross, London ..	"Enlargements, London" ..	—
" " "	Southsea Road, Kingston-on-Thames	"Fry Company, Kingston-on-Thames"	—
Gotz, J. R.	19, Buckingham Street, Strand	"Aplanatic, London".. ..	—

Grayson, H.	11, Market Street, Blackburn	"Grayson, Blackburn"	—
Green, Cross & Bevan	4, New Court, Lincoln's Inn, W.C.	"Phloem, London"	—
Greenwood, H. & Co.	2, York Street, Covent Garden, London	"Photometer, London"	—
Guiterman & Co.	5, Hart Street, Wood Street, E.C.	"Bidental, London"	—
Haines, W. E.	36, High Town, Hereford	"Haines, Hereford"	—
Hardcastle, G. B.	71, East Street, Brighton		220
Harrington Bros.	Shandon Chemical Works, Cork	"Magnesia, Cork"	—
Heywood, John	Ridgefield, Manchester	"Books, Manchester"	—
Harris, Philip & Co., Ltd.	144 to 146, Edmund Street, Birmingham	"Science, Birmingham"	—
Hinton & Co.	Bedford Street, Strand, W.C.	"Sensitize, London"	—
Hockin, Wilson & Co.	Duke Street, Manchester Square, London		3,565
Holmes, Sadler & Holmes	24, Southall Street, Strangeways, Manchester	"Unique, Manchester"	—
Hopkin & Williams	16, Cross Street, Hatton Garden, E.C.	"Cerium, London"	—
Houghton, G. & Son	89, High Holborn, London, E.C.	"Bromide, London"	—
Hughes, H. & Son	59, Fenchurch Street, London	"Azimuth, London"	—
Hughes, W. C.	82, Mortimer Road, Kingsland, London, N.	"Pamphengos, London"	—
Hulme, S.	Exchange Buildings, New Street, Birmingham	"Hulme, Birmingham"	—
Hume, W.	1, Lothian Street, Edinburgh	"Hume, Edinburgh"	—
Humphries, W. H. & Co.	268, Upper Street, London, N.	"Focimeter, London"	—
Iliffe & Son	3, St. Bride Street, Ludgate Circus, E.C.	"Cyclist, London"	—
Illingworth, T. & Co.	38, Sheriff Road, West Hampstead, N.W.	"Squeegee, London"	—
Imperial Dry Plate Co., Ltd.	Cricklewood, London, N.W.	"Eothen, London"	—
Jacquemin J. B. Bros.	65, Hatton Garden, London	"Magnifying, London"	—
Johnson & Sons	Cross Street, Finsbury, E.C.	"Caustig, London"	—
Johnson, W. & Sons	14, 15, and 16, Gough Square, London, E.C.	"Floriform, London"	—
Johnson, Matthey & Co.	75, Hatton Garden, E.C.	"Matthey, London"	—
Johnson, Walker & Tolhurst	80, Aldersgate Street, London, E.C.	"Jowato, London"	6,599
Just, Dr. E. A.	Frangengrasse No. 2a, Vienna	"Justea, Vienna"	—
Kent, W. & Co.	23, Paternoster Row, E.C.	"Paterkent, London"	—
König, Otto & Co.	27, Cross Street, Finsbury Pavement, London, E.C.	"Ginok, London"	—
Kuntzen, H. & Co.	44, 47, Bishopsgate Street Without, E.C.	"Gambadoes, London"	—
Lancaster, J. & Son	Colmore Row, Birmingham	"Lankster, Birmingham"	216
Lennon, B. G. & Co.	14, Bunhill Row, London, E.C.	"Lennon, Bunhill Row, London"	—
Lewis, H. C. & Co., Limited	31, Bold Street, Liverpool	"Specialite, Liverpool"	159

Name.	Postal Address.	Telegraphic Address.	Telephone Number.
Loman & Co.	90, Damrak, Amsterdam	"Reflex, Amsterdam"	—
London Stereoscopic Co., Ltd	106 and 108, Regent Street, W.	"Ampho, London"	—
	54, Cheapside, E.C.	"Stereoscopic, London"	—
London & Paris Optic & Clock Co.	22, Edmund Place, Aldersgate Street, E.C.	"Lunettier, London"	—
Lucas, Joseph & Son	Little King Street, Birmingham	"Lucas, Birmingham"	4,072
Manchester Oxygen Co.	Great Marlborough Street, Manchester	"Oxygen, Manchester"	321A
Marion & Co.	22 and 23, Soho Square, London	"Noiram, London"	—
Marlborough & Co.	51, Old Bailey, E.C.	"Marlborough, London"	—
Marlow, E.	28, Constitution Hill, Birmingham	"Photographic, Birmingham"	—
Mason, George & Co.	180—186, Sauchiehall Street, Glasgow	"Soda, Glasgow"	140
Mawson & Swan	11-15, Moseley Street, Newcastle-on-Tyne	"Mauds, Newcastle-on-Tyne"	—
	33, Soho Square, London, W.	"Focussing, London"	—
McGhie & Co.	75, St. Vincent Street, Glasgow	"Solar, Glasgow"	3,607
Morgan & Kidd	Kew Foot Road, Richmond, Surrey	"Argentic, Richmond"	—
Morison Bros.	99, Buchanan Street, Glasgow	"Drawing, Glasgow"	—
Morley & Cooper	70, Upper Street, London, N.	"Newest, London"	—
Müller, A. E.	9, Fenchurch Street, London, E.C.	"Probatrim, London"	—
Nadar	53, Rue des Mathurins, Paris	"Nadar, Paris"	—
Negretti & Zambra	Holborn Viaduct, London, W.C.	"Negretti, London"	6,583
Nelson, Dale & Co., G., Limited	14, Dowgate Hill, London, E.C.	"Daleson, London"	—
Noakes, J. & Son	South London Works, Greenwich		8,029
Oakley & Co.	202 and 203, Grange Road, S.E.	"Oakley's Grange, London"	—
Osborne, Edwin	Red Lion Square, London, W.C.	"Enrobo, London"	—
Packer, F. G.	48, Trinity Street, Hanley	"Packer, Hanley"	—
Paget Prize Plate Co.	Watford	"Paget, Watford"	—
Park, Henry	5, Station Buildings, Acton Street, Kingsland Road, London, N.E.	"Pernicity, London"	—
Parkinson's Condensed Gas Co.	Stretford, Lancashire	"Oxide, Stretford"	—
Partridge, Sam. C	226, Bush Street, San Francisco, Cal., U.S.A.	"Partridge, San Francisco"	—
Perken, Son & Rayment	99, Hatton Garden, E.C.	"Optimus, London"	—
Pexton, Chatham	22, Gray's Inn Road, London	"Dissolving, London"	—

Photographic Artists' Co-op. Supply Association, Limited	43, Charterhouse Square, E.C., and 91, Gracechurch Street, E.C.	"Photographic, London" .. —
Photographic Enlarging Co. ..	West Street, Brighton	"Enlargements, Brighton" —
"Photographic Review of Reviews"	Walter D. Welford, 47, Hagley Road, Birmingham	"Review, Birmingham" .. —
Platinotype Co, The	29, Southampton Row, W.C.	"Platinotype, London" .. —
Ponders & Baker	Featherstone Street, City Road.. .. .	"Artifex, London" .. . —
Preston, J.	4, High Street, Sheffield	 397
Price, Talbot & Co, Ltd	26, Ludgate Hill, E.C.	"Multiplex, London" .. —
Pringle, Robert & Co. .. .	40 and 42, Clerkenwell Road, E.C.	"Wilderness, London" .. —
Reynolds & Branson..	14, Commercial Street, Leeds	"Reynolds, Leeds" .. . 50A
Rivot, A. & Co...	Willesden Green, N.W.	"Rivot, Willesden".. . .
Ross & Co.	112, New Bond Street, W.	"Rossano, London" .. . —
Rouch, W. W. & Co.	180, Strand, London, W.C.	"Pyroxyline, London" .. —
Rowley, C. & Co., Ltd. .. .	Lund Street, New Cross, Manchester	"Ormolu, Manchester" .. —
Schölzig, Oscar	Dashwood House, 9, New Broad Street, E.C.	"Schölzig, London" .. .. —
Schölzig, Otto..	31, Binfield Road, Clapham Road, S W. ..	"Obtestor, London" .
Schwarz, Arthur & Co. .. .	Dashwood House, 9, New Broad Street, E.C.	"Rantist, London" .. .. —
Scottish Sensitised Paper Co. ..	57, Hope Street, Glasgow	"Sensitize, Glasgow" .. —
Scovill & Adams Co., The	423, Broome Street, New York, U.S.A. .	"Chemistry, New York" —
Secretan, G. W.	210A, Tufnell Park Road, N.	"Characteristic, London".. —
Senier, Harrold & Co. .. .	88, Norwood Road, London, S.E.	"Liquefy, London" .. . —
Sharp & Hitchmough	101 and 103, Dale Street, Liverpool	"Aptus Finder, Liverpool" —
Sharples, G.	7, Fishergate, Preston	"Sharples, Preston" .
Sheffield Photographic Co. ..	Fargate, Sheffield	 68
Shew, J. F. & Co.	87, 88, Newman Street, W.	"Developer, London" . —
Slater, William F.	169, Southampton Street, Camberwell, S E ..	"Mountings, London" . —
Smith, W. H. & Sons...	186, Strand, W.C.	"Bookstalls, London" .. —
	Blackfriars Street, Manchester	"Friarsmith, Manchester" —
Spencer, John	125, West Regent Street, Glasgow	"Spencer, Glasgow" .. 96
Stanley, W. F.	13, Railway Approach, London Bridge, S E.	"Actinometer, London" .. 4.87
Stutchbury, J. & Sons	34, Leadenhall Street, London, E.C.	"Stutchbury, London" .. —
Talbot & Eamer	7, Exchange Street, Blackburn	"Eamer, Blackburn" . —
Talbot, Romain	Kaiser Wilhelm Strasse 46, Berlin	"Talbot, Berlin" .. .. —
Taylor, Taylor & Hobson	Slate Street Works, Leicester	"Lenses, Leicester" .. 134
	6, Southampton Street, High Holborn, W.C.	"Illiquo, London" .. .. —

Name.	Postal Address.	Telegraphic Address.	Telephone Number.
Taylor, Tunnicliff & Co.	Eastwood, Hanley	"Eastwood, Hanley"	12
Theobald & Co.	43, Farringdon Road, London, E.C.	"Theobald, London"	6,767
	20, Church Street, Kensington, London, W.	"Theobald, London"	8,597
Thomas, R. W. & Co., Ltd.	10, Pall Mall, London, S.W.	"Ruhtra, London"	35,037
Thomson, J.	Lintmill, Portgordon, Glasgow	"Scotia, Portgordon"	—
Tonks, W. & Son, Ltd.	Moseley Street, Birmingham	"Brass, Birmingham"	52
Tyler, Walter	48—50, Waterloo Road, London	"Walter Tyler, London"	4,848
Underwood, E. & T.	130—132, Granville Street, Birmingham	"Instanto, Birmingham"	—
United Alkali Co., Ltd.	Curlew Chemical Works, Jarrow-on-Tyne	"Ubique, Jarrow"	—
United Artists' Co., Ltd., The	Curlew Chemical Works, Jarrow-on-Tyne	"Ubique, Jarrow"	2
Valentine & Sons	Perth Road, Dundee	"Valentine, Dundee"	808
Verel, F. W. & Co.	Cathcart, near Glasgow	"Matchless, Cathcart"	—
Wachtl, Bernhard	VII. Kirchberggrasse 37, Wien	"Bernhard-Wachtl, Wien"	—
Waterlow & Sons, Ltd.	Finsbury Works, London, E.C.	"Waterlows, London"	507
Watson, W. & Sons	313, High Holborn, London	"Optics, London"	2,741
Welby, D. & J	20, Garrick Street, Covent Garden, London	"Weelby, London"	3,637
Welford, Walter D	"Photographic Review of Reviews," 47, Hagley Road, Birmingham	"Review, Birmingham"	—
Wells, Gallimore & Taylor, Ltd.	Windsor Street, Birmingham	"Fides, Birmingham"	—
White, R. H.	18, Park Row, Leeds	"Optician, Leeds"	—
Whitelow, E. T.	70, Deansgate, Manchester	"Allmann, Manchester"	—
Whitfield, John, F.C.S.	Scarborough		—
Wiggin & Son	34, St. Matthew's, Ipswich	"Wiggin, Ipswich"	19
Wilkinson & Co.	15, Holmeside, Borough Road, Sunderland	"Oxygen, Sunderland"	—
Wilson, G. W. & Co.	2, St. Swithin's Street, Aberdeen		—
Wood, E. G.	74, Cheapside, London	"Euphaneron, London"	318
Woodbury, P. P. Co.	6, Great New Street, E.C.	"Spotless, London"	—
Woolley, Jas. Sons & Co.	69, Market Street, Manchester	"Pharmacy, Manchester"	—
Wratten & Wainwright	38, Great Queen Street, London, W.C.	"Wratten, London"	939
Wyleys Limited	Manufacturing Chemists, Coventry	"Wyleys, Coventry"	2,776
York & Son	87, Lancaster Road, London, W.	"Vassalage, London"	17
Zimmermann, A. M.	6 and 7, Cross Lane, London, E.C.	"Zimmermann, London"	—
			2,144

The following are not registered, but we are informed that they will be found sufficient in each case, and their use will save money when telegraphing:—

Name.	Postal Address.	Telegraphic Address.
Autotype Co., The	74, New Oxford Street, London, W.C	"Autotype Co., London"
Bates, Wm.	East Street, Chertsey	"Bates, Chertsey"
Becker, F. E & Co.	33, 35, and 37, Hatton Wall, E.C.	"Becker, Hatton Wall, London"
Bool, A. H.	93, Harwood Road, Walham Green	"Bool, Walham Green"
Booth Bros.	65, Upper Stephen Street, Dublin	"Booth Bros., Dublin"
Bracher & Co.	West Hill, Wincanton	"Bracher, Wincanton"
Brooks, William	Laurel Villa, Wray Park, Reigate, Surrey	"Brooks, Reigate"
Caldwell, G.	95, Carrington Street, Nottingham	"Caldwell, Nottingham"
Carbutt, John	Wayne Junction, Philadelphia, U.S.A.	"Carbutt, Philadelphia"
Cowgill, B.	Chemist, Burnley, Lancashire	"Cowgill, Chemist, Burnley"
Cramer, G.	Dry Plate Works, St. Louis, U.S A	"Cramer, St. Louis"
Cusworth, C.	Eagle House, Hainault Road, Leytonstone, London	'Cusworth, Leytonstone"
Dewey, Alfred	Sidcup, Kent	"Dewey, Sidcup"
Done, John & Co.	New Barnet, Herts	'Done, New Barnet"
Duran, Francesco	21, Terrace Road, Handsworth, Birmingham	"Duran, Handsworth, Birmingham"
Durand, C.	18, Garrick Street, Covent Garden, W.C.	"Durand, 18, Garrick Street, W.C."
Dyson, Edward	Shambles Lane, Huddersfield	"Dyson, Shambles, Huddersfield"
Epstein & Co.	33, Broad Street, Bristol	"Epstein, Broad Street, Bristol"
Eidsforth & Mudford	Jackson Road, Holloway, N.	"Eidsforth, Mudford, Holloway"
Forrest, Thomas	Cambrian Studio, Pontypridd	"Forrest, Photo, Pontypridd"
Grayson, Harry	11, New Market Street, Blackburn	'Grayson, Blackburn"
Griffin, John J. & Sons, Ltd.	22, Garrick Street, Covent Garden, W.C.	"Griffen, Garrick St., W.C."
Griffiths, W. & Co., Ltd.	Highgate Square, Moseley Road, Birmingham	'Griffiths, Highgate Square, Birmingham"
Hardcastle, J. B.	71, East Street, Brighton	"Hardcastle, Brighton"
Harmer, John	Littlehampton	"Harmer, Little Hampton"
Hemery, Lindsay	Hanover Studios, Peckham, S.E.	"Hemery, Peckham"
Henderson, James	13, Crown Street, Aberdeen	"Henderson, Crown Street, Aberdeen"

Name.	Postal Address.	Telegraphic Address.
Hunter, Jas. & Co.	28, Norwood Road, Herne Hill, S.E.	"Hunter, Norwood Road, London"
Hurman, F. K. & Co.	2, St. Nicholas Buildings, Newcastle-on-Tyne	"Hurman, Newcastle-on-Tyne"
Husbands, Henry	8, St. Augustine's Parade, Bristol	"Husbands, Optician, Bristol"
Iliffe & Son	19, Hertford Street, Coventry	"Cyclist, Coventry"
Keene, Richard	Photographer, Derby	"Keene, Derby"
Levi, S. J. & Co	71, Farringdon Road, London, E.C.	"Levi, Farringdon Road, London"
Lewis, C. Hethton	Cloudesley Road, St Leonard's-on-Sea	
Lockyer, J. E.	88, Evelyn Street, Deptford, S.E.	"Lockyer, Deptford"
Lund, Percy & Co.	St. John's Street, Bradford	"Percy Lund, Bradford"
Martin, G. S.	Bream's Buildings, Chancery Lane, London	"Martin, Bream's Buildings, London"
Mitchell, S. & J.	17, North Gate, Blackburn	"Mitchell, Northgate, Blackburn"
McDonald, A.	Myars Street, Keswick	"McDonald, Keswick"
Moore, J. W.	7, Market Square, Hanley	"J. W. Moore, Hanley"
Noakes, J. & Son	South London Works, Greenwich	"Noakes, Greenwich"
Preston, J.	4, High Street, Sheffield	"Preston, Photo Chemist, Sheffield"
Redshaw, W. H.	Bourne, Lincolnshire	"Redshaw, Bourne"
Riley Brothers	Bradford	"Riley Bros., Bradford"
Robinson, J. B.	31, Moor Lane, E.C.	"Robinson, Moor Lane"
Sheffield Photo Co.	3, Fargate, Sheffield	"Photo Co., Sheffield"
Skinner, J. H. & Co.	East Dereham, Norfolk	"Skinner, Dereham"
Spurge, A.	41, Milsom Street, Bath	"Spurge, Photographer, Bath"
Steward, J. H.	406, Strand, W.C.	"J. H. Steward, London"
Thornton-Pickard Manufacturing Co., The	8, St. Mary's Street, Deansgate, Manchester	"Thornton-Pickard, Manchester"
Tylar, Wm.	57, High Street, Aston, Birmingham	"Tylar, Sixways, Birmingham"
Vevers, C. C.	12, Market Street, Briggate, Leeds	"Vevers, Briggate, Leeds"
Watts, Isaac	Altrincham, Cheshire	"Isaac Watts, Altrincham"
Wilkinson & Co.	15, Holmeside, Borough Road, Sunderland	"Oxygen, Sunderland"
Wormald, A. R.	Sutton, Surrey	"Wormald, Sutton, Surrey"
Wray, W.	North Hill, Highgate, London, N.	"Wray, Highgate, London"
Wright, J. W.	141, St. James's Street, Burnley	"Wright, Chemist, Burnley"
Young, J.	16, Gallowtree Gate, Leicester	"Young, Analyst, Leicester"

Directory to Registered Telegraphic Addresses.

ARRANGED ACCORDING TO TELEGRAPHIC CYPHER.

Actinometer, London	W. F. Stanley.
Albumen, Glasgow	Albion Albumenising Co.
Allmann, Manchester	E. T. Whitelow.
Ampho, London	London Stereoscopic Co., Ltd., 106 and 108, Regent Street, W.
Aplanatic, London	J. R. Gotz.
Aptus Finder, Liverpool ..	Sharp and Hitchmough.
Archway, London	Arundel & Marshall.
Argentic, Richmond	Morgan & Kidd.
Artifex, London	Ponders & Baker.
Azimuth, London	Hughes, H. & Son.
Benfro, London	Benham & Froud, Ltd.
Bernhard-Wachtl, Wien ..	Bernhard Wachtl.
Bidental, London	Ginterman & Co.
Bolastype, London	S. B. Bolas & Co.
Bonnement, London	Bonne & Co.
Books, Manchester	Heywood, John.
Bookstalls, London	W. H. Smith & Sons.
Brass, Birmingham	W. Tonks & Son, Ltd.
Brin's Oxygen, London.. ..	Brin's Oxygen Co., Ltd.
Bromide, London	Houghton, G. & Son.
Camera, Manchester	J. T. Chapman.
Carsons, London..	Walter Carson & Sons.
Cartwright Rattray, Manchester	Cartwright & Rattray, Ltd.
Caustic, London	Johnson & Sons.
Cerium, London	Hopkin & Williams.
Chadburn, Liverpool	Chadburn & Son.
Characteristic, London	G. W. Secretan.
Chemical, Birmingham.. ..	The Frederick Crane Chemical Co.
Chemistry, New York	The Scovill & Adams Co.
Cyclist, London	Iliffe & Son.
Daleson, London..	Geo. Nelson, Dale & Co., Ltd.
Dallmeyer, London	J. H. Dallmeyer.
Desaulles, Birmingham.. ..	S. & G. De Saulles & Co.
Developer, London	J. F. Shew & Co.

Diluggo, London..	Dennis Di Luggo & Co.
Dissolving, London	Chatham Pexton.
Drawing, Glasgow	Morison Bros.
Eamer, Blackburn	Talbot & Eamer.
Eastman, Harrow	The Eastman Photographic Materials' Co., Ltd.
Eastwood, Hanley	Taylor, Tuncliff & Co.
Elliott, Barnet	Elliott & Son.
England, London	J. D. England.
Enlargements, Brighton ..	Brighton Photo Enlarging Co.
Enlargements, London.. ..	Fry Manufacturing Co.
Enrobo, London	Edwin Osborne.
Eothen, London	Imperial Dry Plate Co., Ltd.
Equatorial, London	A. Clarkson.
Euphaneron, London	E. G. Wood.
Excel, London	B. J. Edwards & Co.
Fallowfield, London	Jonathan Fallowfield.
Fell, Wolverhampton	John Fell & Co.
Fides, Birmingham	Wells, Gallimore & Taylor, Ltd.
Finality, London	Americo-European Trading Co., Ltd.
Floriform, London	Johnson, W. & Sons.
Focimeter, London	Humphries, W. H. & Co.
Focussing, London	Mawson & Swan.
Friarsmith, Manchester ..	W. H. Smith & Sons.
Fry Company, Kingston-on-Thames	Fry Manufacturing Co.
Gambadoes, London	Knutzen, H. & Co.
Ginok, London	König, Otto & Co.
Grayson, Blackburn	H. Grayson.
Gresham, Glasgow	Bolton & Sons.
Haines, Hereford	Haines, W. E.
Hulme, Birmingham	Hulme, S.
Hume, Edinburgh	Hume, W.
Illiquo, London	Taylor, Taylor & Hobson.
Instanto, Birmingham	E. & T. Underwood.
Jowato, London	Johnson, Walker & Tolhurst.
Justea, Vienna	Dr. E. A. Just.
Kallitype, Birmingham.. ..	Birmingham Photographic Co., Ltd.
Kodak, London	The Eastman Photographic Materials Co., Ltd.
Lankster, Birmingham.. ..	Lancaster, J. & Son.
Lennon, Bunhill Row, London .	Lennon, B. G. & Co.
Lenses, Leicester	Taylor, Taylor & Hobson.
Liquefy, London..	Harrold, Senier & Co.
Lucas, Birmingham	Lucas, Joseph & Son.
Lunettier, London	London and Paris Optic and Clock Co.
Magnesia, Cork.	Harrington Brothers.
Magnifying, London	Jacquemin, J. B. Bros.
Marlborough, London	Marlborough & Co.
Matchless, Cathcart	F. W. Verel & Co.

Matthey, London	Johnson, Matthey & Co.
Mauds, Newcastle-on-Tyne ..	Mawson & Swan.
Monochrome, London	The Camera Club.
Mountings, London	William F. Slater.
Mounts, London	Blackfriars Photo and Sensitising Co., Ltd.
Multiplex, London	Price, Talbot & Co., Ltd.
Nadar, Paris	Nadar.
Negative, Liverpool	J. A. Forrest & Son.
Negretti, London	Negretti & Zambra.
Newest, London	Morley & Cooper.
Noiram, London	Marion & Co.
Oakley's Grange, London ..	Oakley & Co.
Objective, London	R. & J. Beck.
Obtestor, London	Otto Schölzig.
Optical, Bradford	R. J. Appleton & Co.
Optician, Leeds	R. H. White.
Optics, London	W. Watson & Sons.
Optimus, London	Perken, Son & Rayment.
Ormolu, Manchester	C. Rowley & Co., Ltd.
Oxide, Stratford	Parkinson's Condensed Gas Co.
Oxygen, Manchester	Manchesier Oxygen Co.
Oxygen, Sunderland	Wilkinson & Co.
Packer, Hanley	F. G. Packer.
Paget, Watford	Paget Prize Plate Company.
Pamphengos, London	Hughes, W. C.
Paper, Liverpool	L. S. Dixon & Co.
Partridge, San Francisco ..	Sam. C. Partridge.
Paterkent, London	W. Kent & Co.
Perfection, Liverpool	John J. Atkinson.
Pernicity, London	Henry Park.
Pharmacy, Manchester	Jas. Woolley, Sons, & Co.
Phloem, London	Green, Cross & Bevan.
Photogen, London	Amphlett, Humphreys & Co.
Photographic, Birmingham ..	E. Marlow.
Photographic, London	Photographic Artists' Co-operative Supply Association, Ltd.
Photometer, London	H. Greenwood & Co.
Plates, Ilford	The Britannia Works Co.
Platinotype, London	The Platinotype Co.
Probatrim, London	Müller, A. E.
Punctual, London	Brown, Scott & Co.
Pyro, London	Adams & Co., 81, Aldersgate, E.C.
Pyroxyline, London	W. W. Rouch & Co.
Rantist, London	Arthur Schwarz & Co.
Reflex, Amsterdam	Loman & Co.
Review, Rirmingham	"Photographic Review of Reviews."
Review, Birmingham	Walter D. Welford
Reynolds, Leeds	Reynolds & Branson.
Rivot, Willesden	A. Rivot & Co.
Rossano, London	Ross & Co.

Ruhtra, London	R. W. Thomas & Co., Ltd.
Schölzig, London	Oscar Schölzig.
Science, Birmingham	Harris, Philip & Co., Ltd.
Scotia, Portgordon	J. Thomson.
Sensitize, Glasgow	Scottish Sensitised Paper Co.
Sensitize, London	Hinton & Co.
Sharples, Preston	G. Sharples.
Snaphanc, London	Adams & Co., 26, Charing Cross Road, W.C.
Soda, Glasgow	Mason, George & Co.
Solar, Glasgow	McGhie & Co.
Specialite, Liverpool .. .	Lewis, H. C. & Co., Limited.
Spencer, Glasgow	Spencer, John.
Spotless, London	P. P. Woodbury & Co.
Squeegee, London	Illingworth, T. & Co.
Stereo, Manchester	W. I. Chadwick.
Stereoscopic, London	London Stereoscopic Co., Ltd., 54, Cheapside, E.C.
Stutchbury, London	J. Stutchbury & Sons.
Talbot, Berlin	Romain Talbot.
Theobald, London	Theobald & Co.
Tyvalvate, New York	E. & H. T. Anthony & Co.
Ubique, Jarrow	The United Artists' Co., Ltd.
Ubique, Jarrow	United Alkali Co., Ltd.
Unique, Manchester	Holmes, Sadler & Holmes.
Valentine, Dundee	Valentine & Sons.
Vassalage, London .. .	York & Son.
Visitcards, Berlin	Carl Ernst & Co.
Walter Tyler, London	Walter Tyler.
Waterlows, London	Waterlow & Sons, Ltd.
Weelby, London	D. & J. Welby.
Wiggin, Ipswich	Wiggin & Son.
Wilderness, London	Robert Pringle & Co.
Wratten, London	Wratten & Wainwright.
Wyleys, Coventry	Wyleys, Limited.
Zimmerman, London	A. M. Zimmerman.

DIRECTORY TO THE PHOTOGRAPHIC TRADE.

THE task of compiling the following directory has been a great and difficult one, and whilst largely added to and increased over that of last year we do not present it to our readers as absolutely complete or perfect, although our every endeavour has been to make it so. In many cases it is difficult, nay, impossible, to ascertain just which firms actually make the articles they sell and which do not. With the exception, therefore, of the makers of lenses, and one or two other branches of the trade of which the information is directly obtainable, we have included as makers all those firms supplying special designs and patterns of their own, irrespective of whether the articles are actually made by or for them. For the facilitation of enquiry we print the names of those firms whose announcements can be consulted in our advertising pages in heavier type. If any houses have been omitted, or wrongly included under any heading, we trust they will notify us of the error that we may correct and not perpetuate it in our next volume.

Manufacturers of Photographic Specialties.

ADAMS & Co. .. .. 81, Aldersgate Street, London, E C.
AIR BRUSH MANUFACTURING Co. .. .. 9, Warwick Court, High Holborn, London.
APPLETON, R. J. & Co .. Manningham Lane, Bradford, Yorks.
ALBION ALBUMENISING Co. .. .. .. 96, Bath Street, Glasgow.
ASHFORD, J. .. 179, Aston Road, Birmingham.
ATKINSON, J. J. .. .. 37, Manchester Street, Liverpool.
BAIRD, A. H. .. .. 15, Lothian Street, Edinburgh.
BAKER, W. R. .. .. Wallington.
BECK, R. & J. .. .. 68, Cornhill, London, E.C.
BENHAM & FROUD .. Chandos Street, London, W.C.
BERESFORD, F. .. .. 14, Bridge Road West, Battersea, London.
BILLCLIFF, JOSHUA .. .. 27, Richmond St., Boundary Lane, Manchester.

BIRMINGHAM PHOTO Co., Ltd. .. .. .. 99 and 100, Gladstone Road, Sparkbrook, Birmingham.
BLACKFRIARS' PHOTOGRAPHIC AND SENSITISING Co. .. .. 1, Surrey Row, Blackfriars' Road, London, S.E.
Bracher & Co. .. .. Wincanton, Somerset.
Braine .. .. .. 22, Bedford Terrace, Moray Road, Holloway, London, N.
Chadwick, W. I. .. .. St. Mary's Street, Deansgate, Manchester.
Chipper, W. C. .. .. 39, Highgate Hill, Upper Holloway, London, N.
Clement & Gilmer.. .. 8 and 10, Rue de Malte, Paris.
Coppin, H. .. .. .. 16 and 17, Poultry, London, E.C.
CROUCH, HY., Ltd. .. 141, Oxford Street, London, W.
DAVENPORT & Co. .. 32, Parkhouse Street, Camberwell, S E.
Dore, Jas. .. .. .. 27, High Street, Sandown, Isle of Wight.
EASTMAN PHOTOGRAPHIC MATERIALS Co., Ltd. .. .. .. 115, Oxford Street, W.
EDWARDS, B. J. & Co. .. The Grove, Hackney, London.
ENDOLITHIC IVORY Co. 61½, Fore Street, London, E.C.
England, J. D. .. .. 24, Charles Street, Royal Crescent, Notting Hill, London.
FALLOWFIELD, J. .. 146, Charing Cross Road, London, W.
Fell, Jas. & Co. .. .. St. James's Works, Wolverhampton.
Fitch, E. H... .. .. 34, Angell Road, Brixton, London, S.W.
Gee, E. T. & Sons .. .. 27, Thomas Street, Liverpool.
GOTZ, J. R... .. .. 19, Buckingham Street, Strand, W.C.
GRAY, A. .. .. .. 44, Snow Hill, London, E.C.
GRIFFIN, J. J. & SONS .. 22, Garrick Street, Covent Garden, London.
GRIFFITHS, WALTER and Co. .. .. .. Highgate Square, Birmingham.
Guye, A., jun. .. .. 77, Farringdon Road, London, E.C.
HANNAM & Co. .. .. Atlas Works, Gainsborough.
HARRISON & SONS .. 28, Woodhouse Lane, Leeds.
HARRIS, PHILIP & Co., Ltd. .. .. .. 144-6, Edmund Street, Birmingham.
Hart, F. W. .. .. .. Holly House, 96, Stoke Newington Road, London, N.
HICKS, J. J. .. .. 10, Hatton Garden, London, E.C.
HINTON & Co. .. .. 38, Bedford Street, Strand, W.C.
HOUGHTON, GEO. & SONS 89, High Holborn, London, W.C.
Hulme .. .. .. New Street, Birmingham.
HUME, W. .. .. .. Photographic Warehouse, Edinburgh.
HUMPHRIES, W. H. & Co. 268, Upper Street, Islington, London, N.
Hunter & Co. .. .. 28, Norwood Road, Herne Hill, S.E.
Husbands .. .. .. 8, St. Augustine's Parade, Bristol.
Inkpen, G. C. .. .. 112, High Street, Portsmouth.
Jacquemin, J. B. Bros. .. 65, Hatton Garden, London, E.C.
James, A. .. .. .. 1, Buckingham Palace Road, London.

JONES, HENRY .. .. 18, Junction Street, Coventry.
JONES BROS. .. .. .. Wolverhampton.
LANCASTER, J. & SON.. Colmore Row, Birmingham.
LEVI, S. J. & Co. .. .. 71, Farringdon Road, E.C.
LEWIS, C. HETHTON .. .. Cloudesley Road, St. Leonard's on-Sea.
LEWIS, G. H. & Co. .. .. 31, Bold Street, Liverpool.
LINDNER, P. A. .. .. 170, Fleet Street, London, E.C.
LIZARS.. .. .. .. 14, Glassford Street, Glasgow.
LLOYD, F. V. A. .. .. 5, South John Street, Liverpool.
LONDON & PARIS OPTIC AND CLOCK Co. .. 22, Edmund Place, and 7, Jewin Street, London.
LONDON STEREOSCOPIC Co. .. .. .. 106-108, Regent Street, London, W.
LUCAS, JOSEPH & SON Little King Street, Birmingham.
LUND, PERCY & Co. .. St. John's Street, Bradford, Yorks.
MANSON, T. .. .. .. 37, Highgate, Kendal.
MARLOWS, LTD. .. .. 28-30, Constitution Hill, Birmingham.
MARION & Co. .. .. 22 and 23, Soho Square, London, W.
MARTIN, G. S. .. .. Bream's Buildings, Chancery Lane, W.C.
MASON, GEO. & Co. .. 180-186, Sauchiehall Street, Glasgow.
MAWSON & SWAN .. 33, Soho Square, London, W.
McGHIE & Co. .. .. 75, St. Vincent Street, Glasgow.
MEDLAND, J. B .. .. 141, Boro', London Bridge, London, S.E.
MIDDLEMISS, W. .. Alice Street, Bradford.
MITCHELL, S. J. .. .. 17, Northgate, Blackburn.
MOORE, JAS. .. .. 18, Vauxhall Street, Birmingham.
NEWMAN & GUARDIA.. 71, Farringdon Road, London, E.C.
OSBORNE, E. .. .. .. Red Lion Square, London, W.C.
OVEREND .. .. .. West Green, Tottenham, London, N.
PAGET PRIZE PLATE Co. Watford.
PARK, HENRY .. .. 1, Orchard Buildings, Acton Street, Kingsland Road, London, N.
PEARSON & DENHAM.. New Station Street, Leeds.
PENROSE, A. W. & Co. .. 5, Anwell Street, Myddleton Square, London, E.C.
PERKEN, SON & RAYMENT .. .. .. 99, Hatton Garden, London, E.C.
PERRY, W... .. .. Leicester House, Grace Hill, Folkestone.
PLACE, J. .. .. .. 13, Bull Street, Birmingham.
PLATINOTYPE Co., THE 29, Southampton Row, Holborn, London, W.C.
PLATT & WITTE .. Birkbeck Works, Birkbeck Road, Ridley Road, alston, N.E.
PONDERS & BAKER .. .. 47, Featherstone Street, Finsbury, London.
PRESTON, J. .. .. 4, High Street, Sheffield.
PRESTWICH, W. H. .. .. Tottenham, London.
PRICE, TALBOT & Co. .. 26, Ludgate Hill, London, E.C.
PUMPHREY, A. .. .. Stanhope Street, Birmingham.
REYNOLDS & BRANSON .. 14, Commercial Street, Leeds.
ROBINSON & SONS .. .. 172, Regent Street, London.
ROUCH, W. W. & Co. .. 180, Strand, London.
ST. BRIDE'S STORES.. 86 and 87, Fleet Street, London.

Scott, A. W...	Ashcombe Road, Weston-super-Mare.
SHARP & HITCHMOUGH	103, Dale Street, Liverpool.
Shaun, Charles	104, Aston Road, Birmingham.
Sheffield Photo Co. ..	3, Fargate, Sheffield.
SHEW, J. F. & Co. ..	87 and 88, Newman Street, London, W.
Skinner, J. H. & Co. ..	East Dereham, Norfolk.
Stanley, W. F.	Railway Approach, London Bridge, London.
Stocks, W.	Rye, Sussex.
Sutcliffe, J. W.	Long Row, Horsforth, near Leeds.
TALBOT, ROMAIN ..	46, Kaiser Wilhelmstrasse, Berlin, C.
TALBOT & EAMER ..	Exchange Street, Blackburn.
TAYLOR, TAYLOR AND HOBSON	Slate Street, Leicester, and 6, Southampton Street, High Holborn, London.
Thorns, Thomas & Co. ..	62, Chelsham Road, Clapham, London.
THORNTON - PICKARD MANUFACTURING Co.	St. Mary's Street, Deansgate, Manchester.
Tonks & Son	Moseley Street, Birmingham.
Turnbull, J. M.	6, Rose Street, Edinburgh.
TYLAR, WM.	57, High Street, Aston, Birmingham.
VEVERS, C. C.	12, Market Street, Briggate, Leeds.
Ward, E.	249, Oxford Street, Manchester.
WATSON, W. & SONS ..	313, High Holborn, London, W.C.
Weare, E. R.	5, Kingsland Road, Birkenhead.
Wells, Gallimore & Taylor	Windsor Street, Birmingham.
WHEELER, GEO. & Co...	46, King Street West, Manchester.
Wood, E. G...	74, Cheapside, London, E.C.
Wormald, A. R. & Co. ..	82, Bishopsgate Within, London, E.C.
WRATTEN & WAINWRIGHT	38, Gt. Queen Street, Long Acre, London.

Photographic Cabinet Makers and Camera Makers.

ADAMS & Co.	81, Aldersgate Street, London, E.C.
ALBION ALBUMENISING Co.	96, Bath Street, Glasgow.
Alford, E. J.	56, Clifton Street, Brighton.
APPLETON, R. & Co. ..	Manningham Lane, Bradford, Yorks.
ARCHER & SONS ..	43, Lord Street, Liverpool.
ASHFORD, J.	179, Aston Road, Birmingham.
ATKINSON, J. J... ..	37, Manchester Street, Liverpool.
BAIRD, A. H.	15, Lothian Street, Edinburgh.
Beck, R. & J.	68, Cornhill, London, E.C.
Becker, F. E. & Co. ..	37, Hatton Wall, London, W.C.
Beyer, W.	5, Kelly Street, Kentish Town, London, N.W.
Billcliff, Joshua	27, Richmond St., Boundary Lane, Manchester.
Birnie, A.	118, Perth Road, Dundee.

BLACKFRIARS PHOTOGRAPHIC AND SENSITISING Co. .. .. 1, Surrey Row, Blackfriars Road, London, S.E.
BRAINE & SONS .. 22, Bedford Terrace, Andover Road, Holloway, N.
BROOKER, A. .. .. 52A, Robertson Street, Hastings.
BROWN, J. E. .. .. 26, Bowling Green Lane, Farringdon Street, E.C.
BROWNING, JNO. .. .. 63, Strand, London, W.C.
CHADWICK, W. I. .. .. St. Mary's Street, Deansgate, Manchester.
CHAPMAN, J. T. .. .. Albert Square, Manchester.
CHIPPER, W. C. .. 39, Highgate Hill, Upper Holloway, London, N.
CLEMENT AND GILMER .. 8 & 10, Rue de Malte, Paris.
COLLINGS, C. G. .. .. 56, Cochrane Street, St. John's Wood, London, N.W.
CROUCH, H., LTD. .. 161, Oxford Street, London, W.
CUSWORTH, C. .. .. Eagle House, Hainault Road, Leytonstone.
DALLMEYER, J. H. .. 19, Bloomsbury Street, London, W.C.
DAVENPORT, J. & Co. .. 32, Parkhouse Street, Camberwell, London, S.E.
DOLLOND & Co. .. .. 35, Ludgate Hill, London.
EASTMAN PHOTOGRAPHIC MATERIALS Co., LTD. .. .. .. 115, Oxford Street, London, W.
ELLIOTT, C. C. .. .. 36, Jewin Street, City, E.C.
FALLOWFIELD, J .. 146, Charing Cross Road, London, W.
FARROW, E. H. .. .. 474, Hornsey Road, London, N.
FRANKS, A. .. .. 95, Deansgate, Manchester.
GANDOLPH, LOUIS .. .. Old Kent Road, S.E.
GOTZ, J. R... .. .. 19, Buckingham Street, Strand, W.C.
GRAYSON, H. .. .. 11, New Market Street, Blackburn.
GRIFFIN, J. J. & SONS, LTD. .. .. .. 22, Garrick Street, Covent Garden, London.
GRIFFITHS, W. & Co., LTD. Highgate Square, Birmingham.
HARE, GEO. .. .. 26, Calthorpe St., Gray's Inn Road, London, W.C.
HARRIS, PHILIP & Co., LTD.. 144/6, Edmund Street, Birmingham.
HILL, G. .. .. .. 186, Broad Street, Birmingham.
HOCKIN, WILSON & Co... 186a, Tottenham Court Road, London, W.
HOLMES & WATSON .. 35, Danbury Street, Islington, London.
HOUGHTON, GEORGE AND SON .. .. .. 89, High Holborn, London, W.C.
HUMPHRIES, W. H. & Co. Upper Street, Islington, London, N.
HURMAN & Co. .. .. 2, St. Nicholas Buildings, Newcastle-on-Tyne.
KING, E. A. .. .. .. 133, Fulham Road, London, W.
LANCASTER, J. & SON.. Colmore Row, Birmingham.
LAWLEY, WALTER .. .. 78, Farringdon Street, London.
LAWRANCE, C. .. .. 141, Fulham Palace Road, Hammersmith, London, W.
LEVI, S. J. & Co. .. .. 71, Farringdon Road, London, E.C.
LIZARS, A. .. .. .. 14, Glassford Street, Glasgow.
LOMAN & Co. .. .. 90, Damrak, Amsterdam.
LONDON & PARIS OPTIC AND CLOCK Co. .. 7, Jewin Street, London.

LONDON STEREOSCOPIC CO., LTD.	106-108, Regent Street, London, W.
LONSDALE BROS.	3, Cookridge Street, Leeds.
LUND, PERCY & Co.	St. John Street, Bradford, Yorks.
MARION & Co.	22 & 23, Soho Square, London, W.
MARLOWS, LTD.	28 & 30, Constitution Hill, Birmingham.
MASON, GEO. & Co.	186, Sauchiehall Street, Glasgow.
MATTHEWS & Co.	8a, John Bright Street, Birmingham.
MAWSON & SWAN	Moseley Street, Newcastle-on-Tyne.
McGHIE & Co.	75, St. Vincent Street, Glasgow.
McKELLEN, S. D.	Spring Gardens, Manchester.
MEAGHER, P.	21, Southampton Row, London.
MERCER, R. & A. J.	16, King Street, Sparkbrook, Birmingbam.
MIDDLEMISS, W.	Alice Street, Bradford.
MILLER, T.	141, Broughton Road, Salford, Manchester.
MITCHELL, S. J. & Co.	17, Northgate, Blackburn.
MOORSE, H.	154, High Holborn, London, W.C.
MORGAN & KIDD	Kew Foot Road, Richmond, S.W.
MORLEY & COOPER	70, Upper Street, London, N.
MOULT, T. E.	24, Trafford Street, Gaythorne, Manchester.
MURRAY, R. C.	8, Garrick Street, Covent Garden, London, W.C.
NEWMAN & SIMPSON	11, Albemarle Street, Clerkenwell Road, London.
NOAKES, D. & SON	South London Works, Greenwich.
PARK, HENRY	5, Station Buildings, Acton Street, Kingsland Road, N.E.
PARKER & Co.	208, High Holborn, London, W.C.
PEARSON & DENHAM	5, New Station Street, Leeds.
PERKEN SON & RAYMENT	99, Hatton Garden, London, E.C.
PHOTO ARTISTS' CO-OPERATIVE ASSOCIATION	3, Denman Street, London, S.E.
PLATINOTYPE Co., THE	29, Southampton Row, London, W.C.
PRESTON, J. H.	4, High Street, Sheffield.
PRICE & Co, LTD.	26, Ludgate Hill, London, E.C.
RENDELL & Co.	130, Great Charles Street, Birmingbam.
REYNOLDS & BRANSON	14, Commercial Street, Leeds.
RILEY BROS.	5, Cbeapside, Bradford.
RILEY, T. & SON	2, Upper Fenton St., Commercial Road, London, E.
ROBINSON, J. & SONS	65, Grafton Street, Dublin.
ROBERTS, W. G.	Leystonstone, Essex.
ROBERTS, W. T.	44, Church Street, Luton, Beds.
ROSS & Co.	112, New Bond Street, London, W.
ROUCH, W. W. & Co.	180, Strand, London.
SANDS, HUNTER & Co.	20, Cranbourne Street, Leicester Square, London.
SCORER, WM.	North Street, Havant.
SCHOLZIG, OSCAR	Dashwood House, New Broad St., London, E.C.
SHARP & HITCHMOUGH	103, Dale Street, Liverpool.
SHAW, CHARLES	104, Aston Road, Birmingham.
SHEFFIELD PHOTO Co.	3, Fargate, Sheffield.
SHEW, J. F. & Co.	87, 88, Newman Street, London, W.

SKINNER, J. H. & Co.	East Dereham, Norfolk.
SLATER, W. F.	169, Southampton Street, Camherwell, S.E.
STANLEY, W. F.	Railway Approach, London Bridge, London.
STANLEY AND DAWKINS	Kingston Works, Buckingham Street, Birmingham.
SWIFT & SON	81, Tottenham Court Road, London, W.
SWINDEN & EARP	21, Islington, Liverpool.
TALBOT & EAMER	7, 9 & 11, Exchange Street, Blackburn.
TAYLOR, TAYLOR AND HOBSON	Slate Street, Leicester.
THOMSON, JAMES	Lint Mill, Port Gordon, Scotland.
THORNTON - PICKARD MANUFG. Co.	St. Mary's Street, Deansgate, Manchester.
TURNBULL, J. M.	6, Rose Street, Edinburgh.
TYLAR, WILLIAM	57, High Street, Aston, Birmingham.
UNDERWOOD, E. & T.	130, Granville Street, Birmingham.
VEVERS, C. C.	12, Market Street, Briggate, Leeds.
WATKINSON & Co.	New Briggate, Leeds.
WATSON	34, Grainger Street, Newcastle-on-Tyne.
WATSON, W. & SONS	313, High Holborn, London, W.C.
WHITTINGHAM & Co.	43, Charterhouse Square, London, E.C.
WOOD & Co.	14, Bartlett's Buildings, Holborn Circus, W.C.
WOOD, E. G.	74, Cheapside, London, E.C.
WOOD BROS.	73, Lord Street, Liverpool.
WORMALD, A. R. & Co.	82, Bishopsgate Street Within, London.
WRATTEN & WAINWRIGHT	38, Great Queen Street, London, W C.

Makers of Photographic Printing Papers.

(Including sole agents for special brands.)

ADAMS	2, Ladywell Road, Lewisham, London.
ALBION ALBUMENISING Co.	96, Bath Street, Glasgow.
BIRMINGHAM PHOTO Co., LTD.	99 and 100, Gladstone Road, Sparkbrook, Birmingham.
BLACKFRIARS PHOTOGRAPHIC & SENSITISING Co.	1, Surrey Row, Blackfriars Road, London, S.E.
BRITANNIA WORKS Co.	Ilford, London, E.
BULBECK, J.	22, Sussex Street, Pimlico, London.
CLARKE & CLARKE	Ingramgate, Thirsk, Yorkshire.
CURAND, C.	18, Garrick Street, Covent Garden, London.
EASTMAN PHOTOGRAPHIC MATERIALS Co., LTD.	115, Oxford Street, London, W.
EDWARDS, B. J. & Co.	The Grove, Hackney, London.

ELLIOTT & SON .. .. Park Road, Barnet.
FALLOWFIELD, J. .. 146, Charing Cross Road, London, W.
FENN, CHARLES .. .. 26, Fairholme Road, West Kensington, W.
FRY MANUFACTURING Co. .. .. 5, Chandos Street, Charing Cross, London, W.C.
GOTZ, J. R... .. .. 19, Buckingham Street, Strand, W.C.
GREEN, CROSS & BEVAN .. 4, New Court, Lincoln's Inn, London, W.C.
HARDCASTLE & Co. .. 71, East Street, Brighton.
HICKIN & PYEFINCH .. .. Mardol Head, Shrewsbury.
HUMPHRIES, C. E. .. .. 12, Hazelville Road, Hornsey Rise, London.
HURMAN, F. K. & Co. .. 2, St. Nicholas Buildings, Newcastle-on-Tyne.
IMPERIAL DRY PLATE Co. .. .. Cricklewood, London, N.W.
JONES & Co. .. .. .. 49, College Street, Putney.
KÖNIG, OTTO & Co. (Steinbach) .. .. .. 27, Cross Street, Finsbury Pavement, E C.
LAVERS, A. .. .. .. Barnes, Surrey.
LAWRENCE, HENRY .. .. 28, St. Stephen's Avenue, Shepherd's Bush, London.
LIESEGANG, ED. .. Dusseldorf.
LONDON SENSITISED PAPER Co. .. .. 46, Lawford Road, London, N.W.
LUND, PERCY & Co. (Dr. Just's) .. .. .. St. John Street, Bradford, Yorkshire.
MARION & Co. .. .. 22 and 23, Soho Square, London, W.
MASON, GEO. & Co. .. 180 and 186, Sauchiehall Street, Glasgow.
MAWSON & SWAN .. 33, Soho Square, London, W.
MEDLAND .. .. .. 141, Borough, London.
MORGAN & KIDD .. Kew Foot Road, Richmond, Surrey.
MUCKLOW, C... .. .. 1, Dufferin Street, Bunhill Row, London, E.C.
MURRAY, LADY .. .. Chichester Street, London, N.
PLATINOTYPE Co. .. 29, Southampton Row, London, W.C.
POWELL, M. .. .. .. 2, Abbey Road, Brighton.
PRESTWICH, W. H. .. .. Tottenham, London, N.
RIVOT & Co... .. .. Willesden Green, London, N.W.
RUDOWSKY, C. A. (Pizzighelli & Hesekiel) .. .. 3, Guildhall Chambers, Basinghall Street, E.C.
SCHÖLZIG, OSCAR .. Dashwood House, 9, New Broad St., London, E.C.
SCHÖLZIG, OTTO .. 31, Binfield Rd., Clapham Rd., London, S.W.
SCOTT, MISS AMY .. .. King Street, Hammersmith, London.
SMITH, MARK .. .. .. Chemist, Louth, Lincs.
TALBOT, ROMAIN .. 46, Kaiser Wilhelmstrasse, Berlin, C.
TAYLOR, TAYLOR AND HOBSON .. .. .. Slate Street Works, Leicester.
TEAR & SON .. .. .. 12, Clapham Road, London, S.W.
TRAPP & Co. .. .. 1, Bridge Row, Cannon Street, London E.C.
UNIVERSAL SENSITISED PAPER Co. .. .. 78, Cross Street, Manchester.
VEREL, F. W. & Co .. Cathcart, Glasgow.
VEVERS, C. C. .. .. 12, Market Street, Briggate, Leeds.

WATSON, W. & SONS .. 313, High Holborn, London, W.C.
WHELPTON, ROBERT .. .. 30, Defoe Road, Tooting, London, S.W.
WILTON, C. .. .. .. 5, Park Villas, Charlton Road, Blackheath.
WRATTEN & WAINWRIGHT.. .. .. 38, Great Queen Street, London, W.C.

Trade Printers and Retouchers.

ALLNUT, R. .. .. .. 3, Walpole Street, Wolverhampton.
ANSWELL, MISS .. .. 38, St. Leonard's Avenue, Bedford.
BARRETT, REDMOND .. .. 1, Cumberland Street, Eccleston Square, London, S.W.
BLEASDALE, R. H. .. .. Dale End, Birmingham.
BOOL, A. H. .. .. .. 115, Harwood Road, Walham Green, Fulham, S.W.
BRIDGE, F. A. .. .. East Lodge, Dalston Lane, London, N.E.
BRUMWELL, CHAS. W. .. 7, Lower Terrace, Notting Hill, London, W.
CASSELL, MRS. A. E. .. 29, Newstead Road, Liverpool, E.
CROSS, MISS F. .. .. Roul Road, Hanover Park, London, S.E.
CUTMORE, G. .. .. .. 99, Barnsbury Road, Islington, N.
DALES, CHAS... .. .. Greenwich House, West Bournemouth.
DENISON, C. .. .. .. 1, St. Stephen's Avenue, London, W.
DONE, J. & Co. .. .. Lewisham House Works, Woodville Road, New Barnet.
DORNING, H. R. .. .. 8, Pall Mall, Chorley.
EASTMAN PHOTOGRAPHIC MATERIALS Co. .. 115, Oxford Street, London, W.
EDGE .. .. 84, Mallart Street, Hanley, Staffordshire.
EMERY, WILFRED .. .. 24, South Street, Baker Street, London, W.
GREGORY & Co. .. .. 51, Strand, London, W.C.
GRIERSON, MISS .. .. 32, Edith Grove, Chelsea, London.
GRIFFITHS & Co. .. .. Highgate Square, Birmingham.
HALL, G. .. .. .. 30, Louise Road, Stratford, London, E.
HAMILTON, J. M. .. .. 34, St. Enoch Square, Glasgow.
HARDCASTLE & Co. .. 71, East Street, Brighton.
HAROLD, H. W. .. .. Bridge Road, Stoke Ferry.
HEMERY, J. LINDSAY .. Hanover Studio, Peckham, London, S.E.
HICKS, JOHN A... .. New Cross, London, S.E.
HINKINS, FRANK R. .. .. Kneesworth Road, Royston, Cambs.
HUGHES .. .. .. 19, Upper Mount Pleasant Avenue, Rathmines, Dublin.
HUMPHRIES, C. E. .. .. 12, Hazelville Road, Hornsey Rise, London.
ILLINGWORTH, T. & Co. 38, Sherriff Road, West Hampstead, N.W.
JOHNSTONE, MORTIMER .. 104, Queen's Road, Hastings.
JONES & Co... .. .. 49, College Street, Putney.
KEENE, RICHARD .. Irongate, Derby.
KING, MISS .. .. .. 62, Crayford Road, Holloway, London.
LAMBE, A. R. .. .. 245, High Road, Kilburn, London, N.W.
MACK, JAMES .. .. .. 2, King's Square, Goswell Road, London, E.C.

MARTIN, E. W. .. .. 68, High Street, Guildford.
MARTIN, J. & Co. .. Park Villas, New Southgate, London, N.
MARTIN, G. S. .. .. Bream's Buildings, London, E.C.
McEWAN .. .. .. 8, Albert Drive, Crosshill, Glasgow.
McGHIE & Co. .. .. 73, St. Vincent Street, Glasgow.
MILLS, G. W. .. .. 8, Raydon Street, Highgate, N.
MONTGOMERY, Jas. .. .. Hanover Street, Stranraer.
MORGAN & KIDD .. .. New Foot Road, Richmond, Surrey.
MYERS, G. A. .. .. 46A, Market Street, Manchester.
NEWMAN, C. .. .. .. 89, Albion Road, Dalston, London, E.
PARKER, W. .. .. .. 28, Westborough, Scarborough.
PALMER, W. EASTMAN AND SONS .. .. Leicester Road, New Barnet, Herts.
PEACH, L. F. .. .. 104, Gell Street, Sheffield.
PEARL, Miss M. E. .. .. 82, Albion Street, Leeds.
PENN, H. .. .. .. 58, Hinton Street, Pimlico, London.
PUMPHREY, A. .. .. 74, Stanhope Street, Birmingham.
ROE, E. A. .. .. .. 30, Warner Road, Camberwell, S.E.
ROBINSON, William .. .. 91, Vicarage Road, Church St., Camberwell, S.E.
SCHERLER, J. W. .. .. 210A, Tufnell Park Road, London, N.
SHARP & HITCHMOUGH, Dale Street, Liverpool.
SHERRATT, R. .. .. Weaste, Manchester.
STREET & Co. .. .. 68, Bold Street, Liverpool.
STEPHEN & HENNIS .. North Station, Colchester.
TURNER, E. & SON .. .. Bush Hill Park, Enfield.
TURNER, Miss .. .. 78, Seaside Road, Eastbourne.
VEVERS, C. C. .. .. 19, Market Street, Briggate, Leeds.
WATSON, W. & SONS .. 313, High Holborn, London, W.C.
WEBER .. .. .. Tudor Road, Norbiton, Surrey.
WHITWELL, G. .. .. 7, Bench Street, Dover.

Makers of Special Preparations for Photographic Processes.

ANTHONY .. .. .. 2, Spencer Terrace, Putney, London.
BATES, W. .. .. .. East Street, Chertsey, Surrey.
BRAHAM .. .. .. 24, Litchfield Street, Charing Cross Road, London.
BRIDGE, F. E. & Co. .. 89, Hatton Wall, Hatton Garden, London, E.C.
BERRY .. .. Nantwich.
BRIGGS, T. .. .. .. 82, Cobden Street, Stockton-on-Tees.
BROOKES, W. .. .. .. Laurel Villa, Wray Park, Reigate.
CAPE, J. B. .. .. .. 52, Neville Street, Southport.
CORMACK & SON .. .. Ormskirk.
COWELL, B. .. .. .. 64, Manchester Road, Burnley.
EDWARDS, B. J. & Co. .. The Grove, Hackney, London, N.E.
ELLIS, Alfred .. .. 20, Upper Baker Street, London, N.W.
FALLOWFIELD, J. .. 146, Charing Cross Road, London, W.
FELL, Jas. & Co. .. .. St. James's Works, Wolverhampton.

FRY MANUFACTURING Co., The .. .. .. Chandos Street, Charing Cross, London.
Gotz, J. R. .. .. .. 19, Buckingham Street, Strand, London, W.C.
Guye, A., Jun. .. .. 77, Farringdon Road, London, E.C.
HARDCASTLE & Co. .. 71, East Street, Brighton.
HARRINGTON BROS. .. Shandon Chemical Works, Cork.
HARRIS, PHILIP & Co., Ltd. .. .. .. 144-6, Edmund Street, Birmingham.
Hart, F. W. .. .. .. Holly House, 96, Stoke Newington Road, London, N.
Hill, Bros & Freeman .. Victoria Road, Surbiton, London.
HINTON & Co. .. .. 38, Bedford Street, Strand, London, W.C.
Hunter & Co. .. .. 28, Norwood Road, Herne Hill, London, S.E.
Lewis, H. J. & Co. .. .. 31, Bold Street, Liverpool.
Lewis, C. Hethton .. . Cloudesley Road, St. Leonards-on-Sea.
Lockyer, J. E. .. .. 88, Evelyn Street, Deptford, London, S.E.
London Stereoscopic Co. .. 106 and 108, Regent Street, London, W.
LUND & Co., PERCY .. St. John's Street, Bradford, Yorkshire.
MASON, GEO. & Co. .. 180-186, Sauchiehall Street, Glasgow.
MAWSON & SWAN .. 33, Soho Square, London, W.
MOORE, J. .. .. .. 18, Vauxhall Street, Birmingham.
PERKEN, SON AND RAYMENT .. .. 99, Hatton Garden, London, E.C.
PLATINOTYPE Co. .. 29, Southampton Row, London, E.C.
Ponders & Baker .. .. 47, Featherstone Street, Finsbury, London.
Powell, T. H. .. .. 116, Denmark Hill, London, S.E.
Reynolds & Branson .. 14, Commercial Street, Leeds.
Secretan, J. W. .. .. 210a, Tufnell Park Road, London, N.
SHARP & HITCHMOUGH 103, Dale Street, Liverpool.
Simmons, R. .. .. .. Galway.
Stanley, W. F. .. .. Railway Approach, London, S.E.
THOMAS, R. W. & Co. .. 10, Pall Mall, London, S.W.
Thompson, A. E. .. .. 29, Newstead Road, Liverpool.
Thorns & Co. .. .. 62, Chesham Road, Clapham, London.
TYLAR, WM. .. .. 57, High Street, Aston, Birmingham.
Wheeler, Edmund .. .. 43, Western Road, Brighton.
Whitaker, J. B. .. .. Chemical Works, Kendal.
Wood, E. G. .. .. .. 74, Cheapside, London, E.C.
WRATTEN & WAINWRIGHT .. .. .. 38, Great Queen Street, Long Acre, London.
Wright, W. E. .. .. Photographer, Forest Gate, London, E.
Wyleys Limited .. .. Manufacturing Chemists, Coventry.

Photographic Enlargers to the Trade.

Bleasdale, R. H. .. .. Dale End, Birmingham.
Blower, J. R. .. .. 14, Grey Street, Newcastle-on-Tyne.
Bridge, F. A. .. .. East Lodge, Dalston Lane, London, N.E.
Brighton Photo Enlarging Co. .. .. .. West Street, Brighton.

BROOKES, BROOKE	55, Manningham Lane, Bradford, Yorkshire.
CALDWELL, G.	95, Carrington Street, Nottingham.
CHAMBERS, W.	116, Earlsfield Road, Wandsworth, London, S.W.
DALES, CHAS.	Greenwich House, West Bournemouth.
DAVIDSON	Belsay Place, Newcastle-on-Tyne.
EASTMAN PHOTOGRAPHIC MATERIALS Co., LTD.	115, Oxford Street, London, W.
ELECTRIC PHOTO ENLARGING Co.	379, King's Road, Chelsea, London, S.W.
ELLIOTT & SON	Park Road, Barnet.
FAIREY, W. R.	Harrold, Bedford.
FRY MANUFACTURING Co.	Chandos Street, Charing Cross, London, S.W.
GROVES, W. H.	174, Brompton Road, London, S.W.
HAMILTON, J. M.	34, St. Enoch's Square, Glasgow.
HAROLD, H. W.	Bridge Road, Stoke Ferry.
HARRIS, SON & Co.	88, High Street, Merthyr.
HEMERY, J. LINDSAY	Hanover Studio, Peckham, London, S.E.
HICKS, JOHN A.	New Cross, London, S.E.
HINKINS, FRANK R.	Kneesworth Road, Royston, Cambs.
HORNER, JOHN	Littlehampton.
HUNT & THORNTON	267, Friern Road, London, S.E.
ILLINGWORTH, T. & Co.	38, Sherriff Road, West Hampstead, London, N.W.
ISLINGTON PHOTO PRINTING AND ENLARGING Co.	32, Russell Street, Liverpool.
LAMB, A. R.	245, High Road, Kilburn, London, N.W.
LEWIS, F.	11, Braithwaite Road, Birmingham.
MARION & Co.	22 and 23, Soho Square, London, W.
MARTIN, J. & Co.	4 and 5, Park Villas, New Southgate, London, N.
MONTGOMERY, JAMES	Hanover Street, Stranraer.
MORGAN & KIDD	Kew Foot Road, Richmond, Surrey.
MORRISON, W. D.	1, Leamington Villas, Acton, W.
MYERS, G. A.	46A, Market Street, Manchester.
PALMER, W. EASTMAN AND SONS	Leicester Road, New Barnet, Herts.
PEACOCK, L. F.	104, Gell Street, Sheffield.
RICE, E. A.	50, Warner Road, Camberwell, London.
ROBINSON, WILLIAM	31, Vicarage Road, Church Street, Camberwell, London, S.E.
SECRETAN, J. W.	210A, Tufnell Park Road, London, N.
TURNER, H. & SON	Bush Hill Park, Enfield.
VEVERS, C. C.	12, Market Street, Briggate, Leeds.
WICKS, RICHARD	31, West Street, Brighton.
WILLIAMS	33, Loughborough Road, Brixton, London.

Makers of Photographic Shutters.

ADAMS & Co.	81, Aldersgate Street, London, E.C.
ALFORD, E. J.	56, Clifton Street, Brighton.

Beck, R. & J.	68, Cornhill, London, E.C.
Billcliff, Joshua	27, Richmond Street, Boundary Lane, Manchester
Broome, W.	6, Denman Road, Peckham, S E.
Chapman, J. T.	Albert Square, Manchester.
Chipper, W. C.	39, Highgate Hill, Upper Holloway, London, N.
Clement & Gilmer	8 & 10, Rue de Malte, Paris.
Cusworth, C.	Eagle House, Hainault Road, Leytonstone, Essex.
Dewey, Alfred	Sidcup, Kent.
EDWARDS, B. J. & Co.	The Grove, Hackney, London, N.E.
Eidsforth & Mudford	Jackson Road, London, N.
FALLOWFIELD, J.	146, Charing Cross Road, London, W.
Furnell	72, Lordship Lane, East Dulwich, S.E.
GOTZ, J. R.	19, Buckingham Street, Strand, W.C.
HARRIS, P. & Co., Ltd.	144-6, Edmund Street, Birmingham.
LANCASTER, J. & SON	Colmore Row, Birmingham.
Lawley, Walter	78, Farringdon Street, London, E.C.
LOMAN, C. H. & Co.	90, Damrak, Amsterdam.
LONDON STEREOSCOPIC Co.	106-108, Regent Street, London, W.
MARION & Co.	22 & 23, Soho Square, London, W.
Martin, G. S.	Bream's Buildings, Chancery Lane, London, W.C.
Mitchell, S. J.	17, Norgate, Blackburn.
NEWMAN & GUARDIA	71, Farringdon Road, London, E.C.
PEARSON & DENHAM	New Station Street, Leeds.
PERKEN, SON & RAYMENT	99, Hatton Garden, London, E.C.
PLACE, J.	13, Bull Street, Birmingham.
PRESTON, J. H.	4, High Street, Sheffield.
Reynolds & Branson	14, Commercial Street, Leeds.
SANDS, HUNTER & Co	20, Cranbourne Street, Leicester Square, London.
SHEW, J. F. & Co.	88, Newman Street, London, W.
Stanley, W. F.	Railway Approach, London Bridge, London.
TAYLOR, TAYLOR and HOBSON	Slate Street, Leicester.
THORNTON - PICKARD MANUFACTURING Co.	St. Mary's Street, Deansgate, Manchester.
TYLAR, WILLIAM	57, High Street, Aston, Birmingham.
VEVERS, C. C.	12, Market Street, Briggate, Leeds.
Underwood, E. & T.	130, Granville Street, Birmingham.
Whittingham & Co., Ltd.	34, Charterhouse Square, London, E.C.
WRAY, W.	North Hill, Highgate, London, N.

Photographic Chemists (*Manufacturing).

Baker & Wright	48, Patrick Street, Cork.
BROOKER, A.	52a, Robertson Street, Hastings.
Cave, J. R.	52, Nevill Street, Southport.
Chapman, J. T.	Albert Square, Manchester.
Cowgill, B.	Burnley, Lancs.

*Crane (Frederick) Chemical Co.	22, Newhall Hill, Birmingham.
DOLLOND & Co.	35, Ludgate Hill, London.
FALLOWFIELD, J.	146, Charing Cross Road, London, W.
Faye, De	21, David Place, Jersey.
Fitton, G. W.	37, Fore Street, Hertford.
Haines, W E.	Chemist, Hereford.
HARDCASTLE & Co.	71, East Street, Brighton.
*HARRINGTON BROS.	Shandon Chemical Works, Cork.
HARRIS, PHILIP & Co., Ltd.	144-6, Edmund Street, Birmingham.
HINTON & Co.	38, Bedford Street, Strand, W.C.
*HOCKIN, WILSON & Co.	186A, Tottenham Court Road, London, W.
*Hopkin & Williams	16, Cross Street, Hatton Garden, London, E.C.
Lockyer Bros	Deptford, London, S.E.
MARION & Co.	22-23, Soho Square, London, W.
*MAWSON & SWAN	33, Soho Square, London, W.
Munro, D.	66, Burnley Road, Accrington.
Powell, T. N.	116, Denmark Hill, London, S E.
*Richardson, W. H & J. G	Curlew Chemical Works, Jarrow-on-Tyne.
ROUCH, W. W. & Co	180, Strand, London, W C.
WATSON	34, Grainger Street, Newcastle-on-Tyne.
Weakley, O. J.	87, City Road, Manchester.
*Whitaker, J. B.	Chemical Works, Kendal.
Wiggin & Son	34, St. Matthew Street, Ipswich.
Wright, J. W.	14, St. James Street, Burnley, Lancashire.
*Wyleys Limited	Coventry.
Zimmerman, A. M.	6-7, Cross Lane, London, E.C.

Optical and Enlarging Lantern Manufacturers.

ADAMS & Co.	81, Aldersgate Street, London, E.C.
APPLETON, R. J. & Co.	Manningham Lane, Bradford, Yorkshire.
ARCHER & SONS	43, Lord Street, Liverpool.
Chadwick, W. I.	St. Mary's Street, Deansgate, Manchester.
Clement & Gilmer	8 and 10, Rue de Malte, Paris.
Cubley & Preston	4, High Street, Sheffield.
HARRIS, PHILIP & Co., Ltd.	144-6, Edmund Street, Birmingham.
HOUGHTON, G. & SONS	89, High Holborn, London, W.C.
HUGHES, W. C.	82, Mortimer Road, Kingsland Road, London, N.
HUME, WILLIAM	3, Lothian Street, Edinburgh.
Humphries, W. H. & Co.	268, Upper Street, Islington, London, N.
LANCASTER, J. & SON	Colmore Row, Birmingham.
LEVI, S. J. & Co.	71, Farringdon Road, London, E.C.
MIDDLEMISS, W.	Alice Street, Bradford.
NEWTON & Co.	1, Fleet Street, London, E.C.
Noakes & Son	Billingsgate Street, Greenwich.

PERKEN, SON & RAYMENT .. .. .. 99, Hatton Garden, London, E.C.
PEXTON, CHATHAM .. 150, Garfield Buildings, Holborn, London.
PLACE, J. .. .. .. 13, Bull Street, Birmingham.
PLATT & WITTE .. Birkbeck Road, Ridley Road, Dalston, London.
RILEY BROS. .. .. .. 5, Cheapside, Bradford.
SCIOPTICON CO. .. .. 26, Colebrook Road, London, N.
SHENSTONE, J. C. .. .. Photographic Chemist, Colchester.
SHEFFIELD PHOTO CO. 3, Fargate, Sheffield.
STEWARD, J. H. .. .. 406 & 407, Strand, London, W.C.
SWIFT & SON .. .. 81, Tottenham Court Road, London, W.
TYLER, WALTER .. 48 & 50, Waterloo Road, London.
WATSON, W. & SONS .. 313, High Holborn, London, W.C.
WOOD, E. G. .. .. .. 74, Cheapside, London, E.C.

Lantern Slide Makers.

ALBION ALBUMENISING CO. .. .. .. 96, Bath Street, Glasgow.
ARCHER & SONS .. 43, Lord Street, Liverpool.
BRIDGE, F. A. .. .. East Lodge, Dalston Lane, London, N.E.
BROOKS, W. .. .. .. Laurel Villa, Wray Park, Reigate.
FINCHAM, P. H. .. .. Myton Road, West Dulwich, London, S.E.
FRANKLIN, G. E. .. .. Rickmansworth.
GELATINE SLIDE BUREAU .. 169A, Hyde Park Road, Leeds.
HINKINS, FRANK R. .. .. Knebsworth Road, Royston, Cambs.
ILLINGWORTH, T. & Co. 38, Sherriff Road, West Hampstead, N.W.
KNIGHT, CHARLES .. .. 108, High Street, Newport, I.W.
MARTIN, J. & Co. .. 4 and 3, Park Villas, New Southgate, London, N.
MEDLAND, J. B. .. .. 141, Borough, London Bridge, London, S.E.
MOORE, JAS. .. .. 18, Vauxhall Street, Birmingham.
PERKEN, SON AND RAYMENT .. .. 99, Hatton Garden, London, E.C.
PEXTON, C. .. .. 150, Holborn, London.
POULTON & SONS .. .. Taunton Road, Lee, Kent.
PUMPHREY, A. .. .. 62, Stanhope Street, Birmingham.
ROBERTS, W. T. .. .. 44, Church Street, Luton.
SCIOPTICON CO. .. .. 26, Colebrook Row, London, N.
STEWARD, J. H. .. Strand, London, W.C.
TURNER, P. L. .. .. 35, Prince's Square, Kennington Park Road, S.E.
TYLER, WALTER .. .. 48 & 50, Waterloo Road, London.
UNDERHILL, ALFRED .. 32, Clarendon Road, West Croydon, Surrey.
VALENTINE & SONS .. .. 154, Perth Road, Dundee.
WADE, E. W. .. .. 177, Walworth Road, London, S.E.
WARD, E. .. .. .. 249, Oxford Street, Manchester.
WILSON, G. W. & Co. .. 2, St. Swithin's Street, Aberdeen.
YORK & SON .. .. .. 87, Lancaster Road, Notting Hill, London, W.

Dry Plate Manufacturers.

BRITANNIA WORKS Co. Ilford, London, E.
EDWARDS, B. J. & Co. .. The Grove, Hackney, London.
ELLIOT, J. & SON .. Park Road, Barnet, London, N.
ENGLAND, J. DESIRÉ.. .. 22A, Charles Street, Royal Crescent, Notting Hill, W.
FRY MANUFACTURING Co. .. .. Chandos Street, Charing Cross, London, S.W.
GOTZ, J. R. (Importer).. 19, Buckingham Street, Strand, W.C.
GRIFFIN, J. J. & SONS (,,) .. 22, Garrick Street, Covent Garden.
HICKIN & PYEFINCH.. .. Mardel Head, Shrewsbury.
IMPERIAL DRY PLATE Co., LTD. .. .. .. Cricklewood, London, N.W.
LONDON AND PARIS OPTICAL Co. (Importer) 22, Edmund Place, Aldersgate, London, E.C.
MARION & Co. .. .. 22 and 23, Soho Square, London, W.
MAWSON & SWAN .. 33, Soho Square, London, W.
MORGAN & KIDD .. Kew Foot Road, Richmond, Surrey.
MOTHERSILL, JAS. (Importer) 6, Southampton Row, London.
PAGET PRIZE PLATE Co. .. .. Watford.
PRESTWICH, W. H. .. .. Tottenham, London, N.
ROBERT, R. .. .. .. 165, Queen Victoria Street, London, E.C.
ROBINSON J. & SONS .. 65, Grafton Street, Dublin.
ROUCH, W. W. & Co. .. 180, Strand, London.
SYKES, J. ALLEN .. .. Dry Plate Works, Lindley, Huddersfield.
THOMAS, R. W. & Co. .. 10, Pall Mall, London, S.W.
VEREL, F. W. & Co. .. Cathcart, Glasgow.
WOOD, E. G. .. .. .. 74, Cheapside, London, E.C.
WRATTEN & WAINWRIGHT .. .. .. 38, Great Queen Street, London, W.C.

Photographic Publishers.

ALEXANDER AND SHEPHEARD .. .. 22, Furnival Street, Holborn, London.
BRITANNIA WORKS Co. Ilford, London, E.
CARTWRIGHT & RATTRAY .. 64, Fountain Street, Manchester.
FALLOWFIELD, J. .. 146, Charing Cross Road, London.
FRY MANUFACTURING Co. .. .. 5, Chandos Street, Strand, London.
GREENWOOD, H. & Co. .. 2, York Street, Covent Garden, London, W.C.
HAMPTON, JUDD & Co. .. 14, Duke Street, Adelphi, London.
HAZELL, WATSON AND VINEY .. .. .. 1, Creed Lane, Ludgate Hill, London.
ILIFFE & SON .. .. 19, Hertford Street, Coventry, and 3, St. Bride Street, Ludgate Circus, London, E.C.
KEGAN PAUL, TRENCH, TRUBNER & Co, LTD. .. .. 57-59, Ludgate Hill, London, E.C.

LONDON STEREOSCOPIC Co., Ltd. .. 106 and 108, Regent Street, London, W.
LUND, PERCY & Co. .. St. John Street, Bradford, Yorkshire.
Manson, T. .. .. .. 37, Highgate, Kendal.
Mawson & Swan .. .. 55, Sobo Square, London.
MASON, GEO. & Co. .. 180-186, Sauchiehall Street, Glasgow.
PERKEN, SON & RAYMENT .. .. .. 39, Hatton Garden, London, E.C.
PIPER & CARTER .. 5, Furnival Street, Holborn, London.
TYLAR, WM. .. .. 57, High Street, Aston, Birmingham.
VEVERS, C. C. .. .. 12, Market Street, Briggate, Leeds.
Werge, J. .. .. .. 11a, Berners Street, London, W.
WHEELER, GEO. & Co. 46, King Street West, Manchester.
Whittaker & Co. .. .. London.
Whittingham & Co. .. 44, Charterhouse Square, London.
Wormald, A. R. & Co. .. 82, Bishopsgate Within, London.

Photo Engineers and Makers of Burnishers and Camera Fittings.

Birnie, A. .. .. .. 118, Perth Road, Dundee.
Booth Bros... .. .. 65, Upper Stephen Street, Dublin.
EASTMAN PHOTOGRAPHIC MATERIALS CO., Ltd. .. .. .. 115, Oxford Street, London, W.
Harrison & Son .. .. 28, Woodhouse Lane, Leeds.
Knox, Adam .. .. .. Mile End, Glasgow.
LANCASTER, J. & SON Colmore Row, Birmingham.
LONSDALE BROS. .. 3, Cookridge Street, Leeds.
McDonald, A. .. .. Myers Street, Keswick.
MARION & CO. .. .. 22 and 23, Soho Square, London, W.
PARK, HENRY .. .. 5, Station Buildings, Acton Street, Kingsland, N.E.
PERKEN, SON & RAYMENT .. .. .. 99, Hatton Garden, London, E.C.
PLATT & WITTE .. Birkbeck Works, Birkbeck Road, Kingsland, London.
Pogson, M. & Co. .. .. 72, Market Street, Manchester.
Rock, H. .. .. .. Pond Hill, Sheffield.
Rudowsky, C. C. .. .. 3, Guildhall Chambers, Basinghall Street, E.C.
Sutcliffe, J. W. .. .. Horsforth, Leeds.
TAYLOR, TAYLOR and HOBSON .. .. .. Slate Street Works, Leicester.
Tylar, Wm. .. .. .. 57, High Street, Aston, Birmingham.
VEVERS, C. C. .. .. 12, Market Street, Briggate, Leeds.
WATKINSON & Co. .. New Briggate, Leeds.
WATSON, W. & SONS .. 313, High Holborn, London, W.C.
Wells, Gallimore & Taylor Windsor Street, Birmingham.

Makers of Mounts and Frames.

ADAMS & Co.	81, Aldersgate Street, London, E.C.
Ashplant, T. D.	18, Edmund Place, Aldersgate, London, E.C.
Brown, Scott & Co. ..	Red Lion Yard, 254, High Holborn, London, W.C.
Butt, J. E. & Sons ..	Steam Moulding Works, Brighton.
Crown, C.	12 and 14, Bury Street, London, W.C.
Economic Mount Co. ..	King's Langley, Herts.
Epstein, J. & C.	Broad Street, Bristol.
FALLOWFIELD, J. ..	146, Charing Cross Road, London, W.
Fourdrinier, Hunt & Co ..	1, Dufferin Street, Bunhill Row, London, W.C.
Geissler, O.	292, High Holborn, London, W.C.
Guitermann, S. & Co. ..	5, Hart Street, Wood Street, London, E.C.
HANNAM & Co	Atlas Works, Gainsborough.
Holmes, Sadler & Holmes ..	24, Southall Street, Manchester.
Kleffel & Sohn	38 and 39, Brooke Street, Holborn, London, E C.
LUND, PERCY & Co. ..	St. John Street, Bradford, Yorkshire.
MANDER, E. & SON ..	Branston Street, Birmingham.
MARION & Co.	22 and 23, Soho Square, London, W.
MASON, GEO. & Co. ..	180 and 186, Sauchiehall Street, Glasgow.
MORGAN & KIDD ..	Kew Foot Road, Richmond, Surrey.
Osborne, E.	Red Lion Square, London, W.C.
Senier, Harold	88, Norwood Road, London, S.E.
Slater, W. F.	169, Southampton Street, Camberwell, London.
VEVERS, C. C. ..	12, Market Street, Briggate, Leeds.
Ward, W. S.	70, Reedworth Street, Kennington Road, London, S.E.

Dealers in Second-hand Apparatus.

Berry, J. Lindon	43, Cardiff Street, Aberdare.
Biddle, J.	Medlock Street, Hulme, Manchester.
Bleasdale, R. H. ..	Dale End, Birmingham.
Cassingham, W. B.	27, Cambridge Street, Tunbridge Wells.
Chipper, W.C.	39, Highgate Hill, London, N.
City Sale & Exchange Rooms	54, Lime Street, London, E.C.
Collins, C. G.	56, Cochrane Street, St. John's Wood, London, N.W.
Cooper, Frank W.	Ivy House, Bondgate, Darlington.
Hodge, John..	Union Street, Plymouth.
Jackson, W.	71, Oxford Street, Manchester.
Jarvis, H.	2, Barclyde Street, Merefield, Rochdale.
Jones, T.	51, Broad Street, Ludlow.
Lawley, Walter	78, Farringdon Street, London.
MOORE, H.	154, High Holborn, London.
MORLEY & COOPER ..	70, Upper Street, Islington, London, W.
Nichols, G. A.	30, St. Peter Street, Stamford, Lincs.
SANDS, HUNTER & Co.	20, Cranbourne Street, Leicester Square, London.

SLATER, W. F. .. .. 169, Southampton Street, Camberwell, London.
THOMAS & Co. .. .. 98, Great Tower Street, London, E C.
VEVERS, C.C. .. .. 12, Market Street, Briggate, Leeds.
WHITTER, W. F. .. .. Villiers Road, Stapleton Road, Bristol.

Makers of Patent Plate and Print Washers.

ADAMS & Co. .. .. 81, Aldersgate Street, London, E.C.
BAIRD, A. H. .. .. 15, Lothian Street, Edinburgh.
FELL, JAMES & Co. .. .. St. James's Works, Wolverhampton.
GEE, E. T. & SONS .. .. 27, Thomas Street, Liverpool.
HARDCASTLE & Co. .. 71, East Street, Brighton.
HINTON & Co. .. .. 38, Bedford Street, Strand, London, W C.
HUNTER & Co. .. .. 28, Norwood Road, Herne Hill, London, S.E.
LANCASTER, J. & SON.. Colmore Row, Birmingham.
MARION & Co. .. .. 22 and 23, Soho Square, London, W.
PERKEN, SON & RAYMENT .. .. .. 99, Hatton Garden, London, E.C.
PONDERS & BAKER .. .. 47, Featherstone Street, Finsbury, London.
ROOKE, W... .. .. 290, Caledonian Road, London.
SHEFFIELD PHOTO Co. .. 3, Fargate Street, Sheffield.
SMITH & SON.. .. .. 102, Parade, Leamington Spa.
SUTCLIFFE, J. W. .. .. Horsforth, Leeds.
TYLAR, WILLIAM .. 57, High Street, Aston, Birmingham.
VEVERS, C. C. .. .. 12, Market Street, Briggate, Leeds.
WELLS, GALLIMORE & TAYLOR, LIMITED .. .. .. Windsor Street, Birmingham.
WOOD'S WASHER Co... 25, Cumberland Street, Liverpool.

Manufacturers and Importers of Sensitive Negative Films.

CARBUTT, JOHN .. Keystone Dry Plate Works, Wayne Junction, Philadelphia, Pa., U.S.A.
EASTMAN PHOTOGRAPHIC MATERIALS Co., LTD. .. .. 115, Oxford Street, London, W.
EDWARDS, B. J. & Co... The Grove, Hackney, London.
ENGLAND, J. DESIRÉ.. .. 22A, Charles Street, Royal Crescent, Notting Hill, W.
FITCH, E. H. .. .. 34, Angel Road, Brixton, London, S.W.
FRY MANUFACTURING Co., LTD. .. .. .. Chandos Street, Charing Cross, London, S.W.
GOTZ, J. R. (Importer) .. 19, Buckingham Street, Strand, W.C.
GUITERMAN, S. & Co. (Importers) .. .. .. 5, Hart Street, Wood Street, London, E.C.

LONDON STEREOSCOPIC Co., LTD. (Importers) .. .. .. 106 and 108, Regent Street, London, W.
MARION & Co. (Importers) 22 and 23, Soho Square, London, W.
NEWMAN & SIMPSON .. .. 11, Albemarle Street, Clerkenwell Road, London.
THOMAS, R. W. & Co. .. 10, Pall Mall, London, S.W.
VEREL, F. W. & Co. .. Cathcart, Glasgow.
WOOD, E. G. .. .. .. 74, Cheapside, London, E.C.

Photo-mechanical Process Printers.

ANNAN & SWAN .. .. 7, Devonshire Road, South Lambeth, S.W.
AUTOTYPE Co. .. .. 74, New Oxford Street, London, W.C.
BEMROSE & SONS .. .. Derby.
BILLING, M. & Co., LTD. .. Birmingham.
BOLAS, S. B. & Co. .. 11, Ludgate Hill, London, E.C.
EYRE & SPOTTISWOODE .. Castle Bar, Ealing.
GOTZ, J. R. (Thevoz & Co.) 19, Buckingham Street, Strand, London.
GRAPHOTONE Co. .. Bushey Hill Park, Enfield.
GRIFFITHS, W. & Co., LTD. .. .. .. Highgate Square, Birmingham.
LONDON STEREOSCOPIC Co. .. .. 106-108, Regent Street, London, W.
MARTIN, J. & Co. .. .. Park Villas, New Southgate.
PHOTOPHANE Co. .. .. 846, Old Kent Road, London, S.E.
PUMPHREY, A. .. .. Stanhope Street, Birmingham.
TYPOGRAPHIC ETCHING Co. .. 3, Ludgate Circus, London, E.C.
WATERLOW & SONS .. London Wall, E.C.

Artists in Colour.

BARRETT, REDMOND .. .. 1, Cumberland Street, Eccleston Square, London, S.W.
BEER & SONS .. .. Stapleton Road, Bristol.
BOOL, A. H. .. .. .. 93, Harwood Road, London, S.W.
BROOKES, BROOKE .. .. 55, Manningham Lane, Bradford, Yorks.
CASSELL, MRS. A. E. .. 29, Newstead Road, Liverpool, E.
CHURCH, E. T. .. .. 39, Highgate Hill, London, N.
FREAK, W. J. .. .. 32, Furnival Street, Holborn, London.
HARRIS, SON & Co. .. .. 88, High Street, Merthyr.
KING, W. .. .. .. St. Peter's Park Road, Broadstairs, Kent.
MYERS, G. A. .. .. 46A, Market Street, Manchester.
PEPPER, A. .. .. .. Marlborough Avenue, Hull.
RICKUS, R. .. .. .. Princess Road, Edgbaston, Birmingham.
ROBERTS, E. .. .. .. Partington, Cheshire.
ROGNO, D. .. .. .. 1, New Buildings, Vauxhall, Birmingham.

Lens Manufacturers.

Beck, R. & J.	68, Cornhill, London, E.C.
Burr, C.	Wakefield Street, East Ham, London.
Clement & Gilmer	8 and 10, Rue de Malte, Paris.
CROUCH, HY., Limited	141, Oxford Street, London, W.
DALLMEYER, J. H.	19, Bloomsbury Street, London, W.C.
GOTZ, J. R. (Importer)	19, Buckingham Street, Strand, London, W.C.
PERKEN, SON & RAYMENT	99, Hatton Garden, London, E.C.
ROSS & Co.	112, New Bond Street, London, W.
SWIFT, JAMES & SON	81, Tottenham Court Road, London, W.
TAYLOR, TAYLOR and HOBSON	Slate Street Works, Leicester.
WATSON, W. & SONS	313, High Holborn, London, W.C.
WRAY, W.	North Hill, Highgate, London, N.

Photo-engravers.

ANGERER & GOSCHL	Vienna.
Automatic Engraving Co.	11, Henrietta Street, Covent Garden, W.C.
Buchan & Leslie	101, Leadenhall Street, London, E.C.
CROSSCUP & WEST ENGRAVING Co.	Philadelphia.
Dallas, D. C.	Furnival Street, London, E.C.
LEVYTYPE Co.	Philadelphia.
MEISENBACH Co., Ltd.	Wolfington Road, West Norwood, London, S.E.
SWAINE, J. & Co.	58, Farringdon Street, London.
SUTTON'S PROCESS SYNDICATE, Ltd.	4, Tokenhouse Buildings, London.
Typographic Etching Co.	3, Ludgate Circus, London, E.C.
WOOD, A. & SON	6, St. Bernard's Row, Edinburgh.
Worthington, T. S.	4, Avenue Terrace, York.

Lantern Slide Material Makers.

ADAMS & Co.	81, Aldersgate Street, London, E.C.
BAIRD, A. H.	15, Lothian Street, Edinburgh.
Crown Co.	12 & 14, Bury Street, London, W.C.
DOLLOND & Co.	35, Ludgate Hill, London.
Dore, Jas.	27, High Street, Sandown, I.W.
FRY & Co.	5, Chandos Street, London, W.
Martin, G. S.	Bream's Buildings, London, E.C.
PERKEN, SON and RAYMENT	99, Hatton Garden, London.
PUMPHREY, A.	Stanhope Street, Birmingham.
VEVERS, C. C.	12, Market Street, Briggate, Leeds.
WHEELER, GEO. & Co.	46, King Street West, Manchester.
Wormald, A. R. & Co.	82, Bishopsgate Within, London, E.C.

Makers of Exposure Meters.

FIELD, R. & Co.	142, Suffolk Street, Birmingham.
FUIDGE, E.	Chemist, Stratford-on-Avon.
MARION & Co.	22 and 23, Soho Square, London, W.
PERKEN, SON AND RAYMENT	99, Hatton Garden, London, E.C.
SPENCER, J. H.	35, Bridge Street, Chester.
STANLEY, W. F.	Railway Approach, London Bridge, London, S.E.
TAYLOR, TAYLOR, AND HOBSON	Slate Street, Leicester.
THORNTON-PICKARD MANUFACTURING Co.	St. Mary's Gate, Deansgate, Manchester.
TYLAR, WM.	57, High Street, Aston, Birmingham
WATTS, ISAAC	Altrincham, Cheshire.

Background Manufacturers.

ADAMS & Co.	81, Aldersgate Street, London, E.C.
AVERY, J. & Co.	81, Great Portland Street, London, W.
DYSON, EDWARD	Shambles Lane, Huddersfield.
HOLMES, SADLER & HOLMES	24, Southall Street, Manchester.
LUND, PERCY & Co.	St. John's Street, Bradford, Yorkshire.
MARION & Co.	22 and 23, Soho Square, London, W.
REDSHAW, W. H.	Bourne, Lincolnshire.
SCHOLZIG, OSCAR	Dashwood House, 9, New Broad Street, London, E.C.
WATSON, W. & SONS	313, High Holborn, London, W.C.
WOOLEY, SONS & Co.	Market Street, Manchester.

Accessory Makers.

ADAMS & Co.	81, Aldersgate Street, London, E.C.
DAY, GEORGE	Edward Street, Lady Lane, Leeds.
ELLIOTT, C. E.	36, Jewin Street, City, E.C.
HARRISON & SONS	28, Woodhouse Lane, Leeds
HOLMES, SADLER & HOLMES	24, Southall Street, Manchester.
HOUGHTON, J. & SONS	89, High Holborn, London, W.C.
LEVI, S. J. & Co.	71, Farringdon Road, London, E.C.
MARION & Co.	22 & 23, Soho Square, London, W.
PERKEN, SON & RAYMENT	99, Hatton Garden, London, E.C.
REDSHAW, W. H.	Bourne, Lincolnshire.

Teachers of Photography.

BARRETT, REDMOND	1, Cumberland St., Eccleston Square, London, S.W.
BOOL, A. H.	93, Harwood Road, London, S.W.
CASSELL, MRS. A. E.	29, Newstead Road, Liverpool, E.

COOPER, FRANK W. .. .. Ivy House, Bondgate, Darlington.
DORNING, H. R. .. .. 8, Pall Mall, Chorley.
LEAPER, CLEMENT J. .. Taunton.
LEWIS, C. HETHTON .. Cloudesley Road, St. Leonards-on-Sea.
PIPER, J. .. .. .. 9, East Hill, Wandsworth, London.
ROBINSON, WILLIAM .. .. 31, Vicarage Road, Church Street, Camberwell, London, S.E.

Makers of Dark Room Fittings.

ADAMS & Co. .. .. 81, Aldersgate Street, London, E.C.
BAIRD, A. H. .. .. 15, Lothian Street, Edinburgh.
DAVENPORT & Co. .. 32, Parkhouse Street, Camberwell, London, S.E.
FALLOWFIELD, J .. 146, Charing Cross Road, London, W.
HOUGHTON, GEO. AND SONS .. .. .. 89, High Holborn, London.
HUNTER & Co. .. .. 28, Norwood Road, Herne Hill, London, S E.
MARLOWS, LTD. .. .. 28-30, Constitution Hill, Birmingham.
TYLAR, W... .. .. 57, High Street, Aston, Birmingham.
WORMALD, A. R. & Co. .. 82, Bishopsgate Within, London, E.C.

Photograph Publishers.

BELFORD .. .. .. London.
KNIGHT, CHAS. .. .. Newport, Isle of Wight.
LONDON STEREOSCOPIC Co. .. .. 106, Regent Street, London, W.
POULTON & SONS .. .. Taunton Road, Lee, Kent.
PUMPHREY, A. .. .. 62, Stanhope Street, Birmingham.
VALENTINE & SONS .. .. 154, Perth Road, Dundee.
WILSON, G. W. & Co. .. 2, St. Swithin's Street, Aberdeen.
YORK & SON .. .. .. 87, Lancaster Road, Notting Hill, London, W.

Camera Case Makers.

ADAMS .. .. .. 90, Hatton Garden, London.
BOLTON, C. .. .. .. 35, Great Charles Street, Birmingham.
BROOKS, J. B. & Co. .. 115, Great Charles Street, Birmingham.
FALLOWFIELD, J. .. 146, Charing Cross Road, London.
LEVI, S. J. & Co. .. 71, Farringdon Road, London, E.C.
PERKEN, SON AND RAYMENT .. .. 99, Hatton Garden, E.C.
VEVERS, C. C. .. .. 12, Market Street, Briggate, Leeds.

Photo Glass Merchants.

DE SAULLES, S. & J. AND Co. .. .. .. Daguerre Works, 52-54, Spencer Street, Birmingham.

GRIFFIN, JAS. D. .. Floodgate Street, Birmingham.
HOUGHTON, GEO. AND SON .. .. .. 89, High Holborn, London, W.C.
MARLOWS, LTD. .. .. 28-30, Constitution Hill, Birmingham.
ROBINSON, J. B. .. .. 31, Moor Lane, Cripplegate, London, E.C.

Firms Hiring Out Photographic Apparatus.

BRISTOL PHOTOGRAPHIC STORES .. .. .. 14, Arcade, Broadmead, Bristol.
BROOKER, A. .. .. 52a, Robertson Street, Hastings.
FLATMAN, J. B. .. .. Pevensey Road, Eastbourne.
NICHOLS, G. A. .. .. 30, St. Peter's Street, Stamford.
SMITH'S SUPPLY STORES .. 35, St. Thomas Street, Weymouth.
VICKERY, BROS. .. .. The Studio, Watersmeet Road, Lynmouth.

Refiners.

BLUNDELL, J... .. .. 162, Wardour Street, Oxford Street, London, W.
DAY, EDWARD .. .. Warstone Lane, Birmingham.
PRINGLE, ROBERT & Co. .. 40-42, Clerkenwell Road, London, E.C.
THORNS, THOS. & Co. .. 62, Chelsham Road, Clapham, London.
WELLBY, D. & J... .. 20, Garrick Street, Covent Garden, London, W.C.

Camera Bellows Makers.

DALE, HENRY .. .. 5, Stoke Street, Birmingham.
LEVI, S. J. & Co. .. 71, Farringdon Road, London, E.C.
PLATT & WITTE .. Birkbeck Road, Kingsland, London.
WATKINSON & Co. .. New Briggate, Leeds.

Makers of Cycle Carriers for Photographic Outfits.

CARSONS, WALTER & SONS .. 21 and 22, Bachelors' Walk, Dublin.
FALLOWFIELD, J. .. 146, Charing Cross Road, London, W.
STRETTON, E. A. .. .. Bath Road Cycle Works, Cheltenham.

Manufacturers of Compressed Oxygen.

BRIN'S OXYGEN CO., LD. .. Connaught Mansions, Victoria Street, London, S.W.
MANCHESTER OXYGEN CO., LD. Great Marlborough Street, Oxford Street, Manchester.
SCOTCH & IRISH OXYGEN CO... Polmadie, Glasgow.

Medal Workers and Die Sinkers.

RESTALL, J. A. .. .. St. Martin's Place, Broad Street, Birmingham.
VAUGHTON, P. & SONS .. Gothic Works, Birmingham.

Auctioneers and Valuers of Photo Businesses.

BEASLEY, H. J. .. .. 65, Chancery Lane, London, W.C.
STEVENS, J. C. .. .. 38, King Street, Covent Garden, London.

Gelatine Manufacturers.

NELSON, DALE & Co., LTD. .. .. .. 14, Dowgate Hill, London, E.C.

Wholesale and Retail Dealer in Ferrotype Tins.

CAVE, F. R. .. .. 52, Nevill Street, Southport.

Maker of Ferrotype Materials.

MOORE, JAMES .. .. 18, Vauxhall Street, Birmingham.

Grooved Box Makers.

ARUNDEL & MARSHALL .. Perry Street Works, Hoxton, London.

Makers of Xylonite.

BRITISH XYLONITE CO. .. 124, High Street, Homerton, London, E.

Makers of Electric Lamps for Portraiture.

THE PILSEN CO. .. .. London.

Manufacturer of Colours.

NEWMAN .. .. .. 24, Soho Square, London, W.

PHOTOGRAPHIC DEALERS AND CHEMISTS.

IN the list published last year we did our best to in some way classify the various places where plates and other photographic requisites may be obtained throughout Great Britain. They were divided roughly into four divisions, viz. :—

E. Photographic depôts, photo manufacturers or dealers pure and simple, *i.e.*, where this is the principal business carried on.

F. Chemists and others keeping a stock of, say, three or four makes of plates, together with a fair lot of chemicals, apparatus, and oddments.

G. Shopkeepers, chemists, professional photographers and others, from whom either a certain make of plate may be obtained, or who go into the matter in a less important way than those in Class F.

H. Those described as agents for the goods of certain firms, but who do not, as far as we know, stock other materials or goods.

These comparisons were not made in any spirit save that of letting our readers know to what *extent* they might obtain supplies. Because, as far as convenience goes, the professional photographer, for instance, who would range in class G, perhaps puts himself very much more out of his way to oblige than does the dealer in class E, who, to a great extent, owes his business and living to the sale of these things. Our distinctions were not invidious, but merely with a view to the convenience of our readers.

In the present volume we sought to make this list as complete and reliable as possible. To that end a circular was issued to about 1,400 dealers and chemists, with an attached form to be filled up and returned. But although we incurred all this expense, only 400 odd forms were returned, thus proving a total lack of interest on the part of the dealers themselves. And as it was distinctly stated upon the form, "The details are inserted free of any charge whatever, so we trust no one will lose the opportunity of having their name included," there could be no other excuse, beyond carelessness or lack of business qualification, except it be in the direction of economy—the saving of the halfpenny stamp required to return the form.

However, our list is this year greatly improved, and we trust that in the future more attention will be paid to our request for information. The list is for the benefit of our readers, but it must also prove in many cases an advantage to the dealer. At all events, it is worth the labour of filling up a form, and the expense of one halfpenny.

We invite particulars from all dealers in photographic materials, whether in village or town, and will send a form for filling in details upon receipt of postcard. It is necessary, however, to request that in giving particulars for either the "dark room" or "dealers'" lists, the address should be given in full, as tourists in strange towns have otherwise difficulty in finding the place. An address sufficient for a resident is not always so for a stranger.

EXPLANATORY.

In all cases where particulars have been sent, they are printed as far as possible in the dealer's own words. So, if such a term as "everything" is used, the readers will please understand that the assertion is merely a quotation from his form.

Most of the terms used must be elastic to a certain extent. Where definite makes of plates are mentioned, they are those usually stocked in a fair number of sizes. But in very many cases other makes are occasionally, or in certain sizes, to be had. By requisites is meant dishes, measure glasses, printing frames, and the smaller necessaries. Apparatus is used for cameras, lenses, and tripods.

Where no information has been received, we fall back upon the classification adopted last year, with the addition of

J—Apparatus or specialty manufacturers principally, but who can possibly be utilised otherwise as well. In this division also are included those who can do repairs to apparatus.

NOTE.—The reference letter E signifies an actual photographic depôt, and, as a rule, particulars are not given owing to lack of space. But readers will readily grasp the situation, and not overlook those marked E because no details are given.

Aberdare.

F—ALFRED LEE, 18, Commercial Street.
Ilford plates and papers of all kinds to ¼ plate. Requisites. Developers. Chemicals.

F—J. L. BARRY, 43, Cardiff Street.
Barnet plates up to 15 × 12. Small stock of other makes. Requisites. Developing and toning chemicals.

Aberdeen.

E—JAMES HENDERSON, 13, Crown Street.
Most makes of plates. All materials.

F—W. REID, 100, Holburn Street.

F—J. & J. URQUHART, 65, St. Nicholas Street.
All leading makes of plates and papers. All chemicals and requisites.

F—G. W. WILSON & CO., 25, Crown Street.
Complete stock of plates, papers, requisites, chemicals, and apparatus.

Abingdon.

F—ARTHUR G. RICKARBY, 22, Bath Street.
Ilford, Edwards, Fry, and Thomas plates. All chemicals an requisites.

F—G. OSBORNE, Bath Street.

Accrington.

F—T. STANLEY, Whalley Road.
All leading plates and papers. Requisites. Chemicals. Apparatus.

G—D. MUNRO, 66, Burnley Road.

Alcester.

F—J. D. ADCOCK & SONS, chemists.

Aldershot.

F—JUNIOR ARMY & NAVY STORES, Union Street.

Alloa.

G—NOWAL, 36, Primrose Street.

Alresford.

F—J. H. RICHARDSON, chemist.

Alston.

F—T. STOREY, chemist.

Alton (Hants).

F—GEO. FROST, West End Studio, Market Street.
Ilford and Barnet plates. Small stock chemicals and requisites.
H—H. RICHARDS, Market Street.

Arbroath.

G—S. MILNE, St. Ruth's.

Ashby-de-la-Zouch.

H—R. M. STEWART, 47, Market Street.

Ashford.

G—F. W. STEADMAN, 76, High Street.
Ilford and Paget plates.

Ashton-under-Lyne.

F—STEPHEN SHARP, 241, Stamford Street.
Ilford, Thomas, Paget, and Castle plates. Chemicals. Papers. Requisites.
F —ARDERN, 8, George Street.
H —T. B. SECKER, Old Street.
G -E . FISHER, 160, Stamford Street.
G —W . LEIGH, 200, Oldham Road.
G -[illegible] . GLAZEBROOK, Yorkshire Street.

Aylesbury.

F—A. G. WRIGHT, 16, Market Square.
Ilford, Fry, Barnet and Thomas plates. Papers. Chemicals. Requisites. Apparatus.
F—JOHN WOOD, 35, High Street.
Plates. Papers. Chemicals.
H—W. J. T. NORTH, 35, High Street.
Plates. Papers. Chemicals.

Bainbridge (near Bedale).

G—A. KNAGGS, general dealer.
Ilford plates and papers.

Ballymena.

G—THOMAS ERWIN, 76, Church Street.
Ilford and other plates and papers. Chemicals and materials.

Banbury.

G—F. G. GILKES, 18, High Street.
Ilford plates and papers. Requisites.
F—R. R. GOODMAN, 5, High Street.

Barnet.

F—E. A. MAXWELL, 50, High Street.
Almost everything.

Barnsley.

H—A. OGLESBY, 21, Cheapside.
G—J. WOOD, 9, Peel Street.

Barnstaple.

F—J. J. TREMCER, 65, Boutfort Street.

Barrow.

F—S. TAYLOR, Dalton Road.
G—DAVIS & SONS, Abbey Road.

Bath.

E—A. W. YABSLEY, 9, Old Bond Street.
Barnet, Thomas, Mawson, Edwards, and Ilford plates. Materials and apparatus of every description.
E—H. J. WALKER & Co., 8, Broad Street.
Ilford (to 12 × 10), Paget (to 10 × 8), Barnet and Thomas (to ½ pl.)
Chemicals, papers, requisites, apparatus.
E—W. M. ASHMAN, 12A, Old Bond Street.
Ilford, Barnet, Thomas, and Paget plates. Eastman and England films. Various papers. Every photographic requisite.
F—J. S. GIBBS, 3, Sydney Buildings.

Batley.

F—R. BROADHEAD, 38, Commercial Street.

Bawtry.

F—F. J. JACKSON & SON, High Street.
Plates. Chemicals.

Beckenham.

F—F. BRIGHT, 60, High Street.

Bedale.

G—J. SWINBANK, chemist.
Ilford plates. Papers. Chemicals.

Bedford.

F—ANTHONY & BISS, chemists.
Ilford, Barnet, Thomas, and Marion's plates. All sundries and requisites. Developing and toning solutions.

Belfast.

F—SHARMAN D. NEILL, 12, Donegall Place.
Ilford, Mawson, Edwards, and Paget plates. Eastman films. Apparatus. Requisites. Made up solutions.
F—RODMAN & CO., 41, Donegall Place.
F—T. MALCOLMSON, 143, Royal Avenue.
G—DAVIDSON & LESLIE, 30, Castle Place.
F—W. NICHOLL, Donegall Square, N.

Belper.

G—J. F. HAYNES, High-pavement.
Fry and Ilford plates. Papers. Developers and few sundries.

Bettws-y-Coed.

F—R. PARRY, chemist.
Thomas, Ilford, Castle, Marion, and Barnet plates. Full stock chemicals. Some apparatus. Requisites.

Beverley.

F—T. J. MORLEY & Co., Lair Gate and Toll Gravel.
All best makers' plates. Chemicals. Apparatus.

Bideford.

G—TARDREW & SONS, 9, High Street.
Ilford and Britannia plates and papers, &c., up to 12 × 10.
F—W. H. GOAMAN, Mill Street.
J. SQUIRE, Mill Street.

Birkenhead.

F—CRAGG, JAMES, 80, Argyle Street.
Thomas, Ilford, Mawson and Elliott plates. Chemicals. Papers. Requisites.
G—A. F. BROOKES, Charing Cross.

Birmingham.

F—J. THORPE, 29, Congreve Street.
Waterloo, Edwards, Ilford, Barnett, Thomas, Mawson, and Fry's plates. All kinds of materials and sundries.
F—C. J. JARVIS, Villa Road, Handsworth.
Thomas, Ilford, Edwards, and Wratten plates. All chemicals, papers, and apparatus.
G—GEO. RILEY, 205, Soho Road, Handsworth.
Ilford and Thomas plates. Papers. Requisites.
G—J. DAVIS, 39, Summer Lane.
Ilford plates and papers. All chemicals. Apparatus.
G—E. ALSTON, 243, Ladypool Road, Sparkbrook.
Mawson plates. Papers.
E—S. HULME, New Street.
F—MORRIS, BANKS & Co., 2, High Street.
F—SOUTHALL BROS. & BARCLAY, Bull Street.
F—P. HARRIS & Co., Edmund Street.
J—W. TYLAR, 57, High Street, Aston.
E—R. H. BLEASDALE, 104, Dale End.
E—LANCASTER & SON, Colmore Row.
J—R. & A. J. MERCER, 16, King Street, Sparkbrook.
J—H. DALE, 5, Stoke Street, Islington.
F—J. PLACE, Bull Street.
F—BIRMINGHAM PHOTO Co., Gladstone Road.
G—CHARLES & Co., 109, High Street, Aston.
E—GRIFFITHS & Co., Union Passage, New Street.
Fry's and other plates. All chemicals. Papers. Requisites. Apparatus.

G—GREGOIRE, 353, Moseley Street.
G—BROOKES & ADAMS, 19, Barr Street.
G—HAMPTON & JOHNSON, 240, Great King Street.
J—E. MARLOW, 38, Constitution Hill.
G—J. H. NEWEY, 54, St. Paul's Square.
J—G. HILL, 186, Broad Street.
J. & H. GREEN, 260½, Coventry Road.
J—E. & T. UNDERWOOD, 130, Granville Street.
J—E. DAWKINS, 37, Cox Street West.
J—J. ASHFORD, 179, Aston Road.

Bishop Auckland.

F—THO. DOBINSON, 125, Newgate Street.
Almost everything.
F—H. THORBURN & SON, 3, Newgate Street.

Bishop's Stortford.

G—JOHN HARDY, North Street.
Ilford plates and papers. All chemicals.

Bishopwearmouth.

G—J. SETLEY, 37, New Arcade.

Blaenavon.

H—H. M. DAVIES, chemist, Broad Street.

Blackburn.

E—S. & J. MITCHELL, 17, Northgate.
Mawson, Fry, Ilford, Thomas and Barnet plates. Various papers. Good stock apparatus. All chemicals and requisites.
E—HARRY GRAYSON, 11, New Market Street.
Everything.
F—A. P. GARLAND, 80, King William Street.
G—J. MORRIS, 104, Lower Audley Street.
G—F. W. SHARPLES, 4,Limbrick.
J—TALBOT & EAMER, 7, Exchange Street.

Blackpool.

F—J. JACKSON, 61, Talbot Road.
Ilford, and one or two others. All chemicals and requisites.
H—A. P. GARLAND, 24, Foxhall Road.

Bolton.

F—T. H. HEYES, 150, Deansgate.
Ilford, Barnett, Mawson and Fry's plates. All chemicals and sundries.
E—W. BANKS, 32, Corporation Street.
Edwards, England, and Paget plates. All requisites, chemicals, and papers.
F—G. BARNES, 69, Bradshawgate.
F—WALLER & RILEY, Limited, 19, Bradshawgate.
G—BOYLE & WEBER, 6, Bryng Street.
G—G. A. HASLAM, 21, Trinity Street.
G—PARKINSON BROS.

Boston.

F—C. C. SMITH, 39, Wide Bargate.
H—R. A. MUNKMAN, 98, West Street.
G—LEWIN & Co., 16, Market Place.

Bourne (Lincs.)

E—W. H. REDSHAW.
Thomas and Ilford plates. Papers. Chemicals. Apparatus.

Bournemouth.

F—C. DALES, Greenwich House.
Marion, Ilford, and Paget plates to 15×12. All chemicals, requisites, and papers. Apparatus.
F—S. HARDWICK, 21, Commercial Road.
G—W. JONES, 203, Old Christchurch Road.
G—T. KEYS, 3, The Triangle.
F—G. P. YATES, Boscombe.
G—A. H. HAYNES, Boscombe.

Bradford.

E—J. WALKER, 22, Charles Street.
Ilford, Paget, and Thomas plates.
F—HARRISON, PARKINSON & Co., Sunbridge Road.
Nearly all kinds of plates and apparatus. All chemicals.
F—W. T. TOWNSEND, 1, Heidelberg Road, Manningham.
Ilford plates and papers. Chemicals and requisites.
F—R. J. APPLETON & Co., 58, Manningham Lane.
E—PERCY LUND & Co., St. John Street.
E—RILEY BROS., 5, Cheapside.
G—BRIDGES & SMITH, 55, North Parade.
G—S. D. SCORAH, 11, Leeds Row.

Braintree.

F—F. ROW & SON, High Street.

Bramley (Nr. Leeds).

F—W. S. BAXTER, chemist.
Thomas, Ilford, and other plates.

Brampton.

G—YOUNGER, chemist.

Brechin, N.B.

F—G. MACKIE, 51, High Street.
Castle, Mawson, Ilford, and Edwards' plates. Papers. Chemicals. Requisites.
F—W. JAMIESON, 58, Southesk Street.

Bridgwater.

F—S. H. LLEWELLYN.
Paget and Ilford plates. Papers. Sundries.
H—BASKER & Co., Fore Street.
SQUIBBS, Queen Street.

Bridlington Quay.

G—H. J. JACKSON, 11, Prince Street.
G—B. ALLANSON, Esplanade.

Brighouse.

F—W. DAWSON, Huddersfield Road.
Ilford and Castle plates. Most ordinary requisites.

Brighton.

E—CHURCHILL & Co., 57 and 58, East Street.
Every English plate, also Fry's and Lumiere. All papers. Chemicals. Requisites.
F—J. WILLIAMSON, 144, Church Road, Hove.
Barnet, Britannia, Ilford, and Fry's plates. Chemicals. Requisites. Papers. Apparatus.
J—E. J. ALFORD, 56, Clifton Street.
Apparatus manufacturer. Various requisites.
F—HARDCASTLE & Co., 71, East Street.
G—BRIGHTON ENLARGING Co., 31, West Street.
G—AMERICAN CAMERA Co.

Bristol.

E—M. W. DUNSCOMBE, 10, St. Augustine's Parade.
All makes of plates. Chemicals. Requisites. Papers. Apparatus.
E—H. HUSBANDS, 3, St. Augustine's Parade.
Ilford Thomas, Paget, and Wratten plates. Materials and sundries.
E—W. T. WHETTER, 14, Lower Arcade, Broadmead.
Ilford plates, all sizes to 15 × 12. All other photo requisites. Apparatus on hire.
F—A. SALANSON & Co., 28, High Street.
F—A. SALANSON & Co., 127, Bridge Street.
F—S. BURDGE, 32, High Street.
F—HODDER & SON, Limited, 8, Broad Street.
G—B. LOBB, 214, Gloster Road.
G—W. H. BARTON, Church Lane, St. Michael's.
G—H. E. BRIGHTMAN, 47, Wine Street.

Bromley (Kent).

F—SHILLCOCK & SON, 122, High Street.
Marion, Ilford, Thomas, Edwards, Paget, and other plates. All necessary materials, papers, &c., and apparatus.

Bude.

G—T. F. CARTER, 7, Summerlease Crescent.

Burnley.

E—J. W. WRIGHT, 141, St. James Street.
General stock.
F—B. COWGILL, 58, Manchester Road.

Burslem.

F—T. BLACKSHAW, 35, Market Place.
All sizes Ilford plates, also Paget. Papers. Chemicals. General photo sundries.

Burton-on-Trent.

G—A. BERNARD, 48, Station Street.
Ilford plates and papers. Chemicals and sundries.
F—D. W. BARDILL & Co., Ltd., 171, High Street.
F—R. KEENE, 52, High Street.
Various plates. Papers. Chemicals. Sundries.

Bury (Lancs.)

F—HEYWOOD & Co., 41, Princes Street.
Thomas, Mawson, and Ilford plates. All chemicals and oddments.
G—W. S. BARLOW, 7, Fleet Street.

Bushey New Town (Herts.)

F—R. H. GANT, 32, Villiers Road.
Three kinds of plates. Papers. Chemicals. Sundries.

Camborne.

F—W. J. NICHOLLS, Market Square.

Cambridge.

G—E. FIELD, Hills Road.
Ilford and Paget plates. Chemicals.
F—BEALL & SON, chemists, 25, Sidney Street.
About half-doz. makers' plates. Good stock of chemicals and materials.
F—J. H. LEECH, 36, Trinity Street.
Mawson's, Thomas, Paget, Ilford, and Edwards plates. Eastman's films. Requisites. Chemicals.
H—SHIRTON & SONS, chemists.
F—MORLEY & Co., 6, Hobson Street.
F—J. B. BRYANT, 78, Regent Street.
F—E. SANDERSON, 48, Bridge Street.

Canterbury.

F—W. POLLARD, 58, St. George Street.
Various plates in ordinary sizes. Papers. Chemicals. Requisites.
G—W. H. FIDDIAN, 62, King's Bridge.
Ilford plates. Requisites. Chemicals.
F—J. CRAIK, 4, St. George Street.
H—E. & G. FULLAGAR, 52, George Street.

Cardiff.

F—J. R. WOOD, 4, Castle Arcade.
Paget, Ilford, and other plates.
F—JESSE WILLIAMS & Co., Park Hall Buildings.
F—R. W. DUCK & Co., St. John's Square.
F—W. T. HICKS & Co., Limited, 28, Duke Street.
G—T. RIDLEY, 9, English Street.

Cardigan.

F—C. E. EVANS, chemist.

Carlisle.

F—JOHN ROBSON, 26, Scotch Street.
Fry's, Ilford, and Paget plates. Stock of chemicals, requisites, and apparatus.
F—HALL READ, Denton Street.
F—J. BELL & SON, Central Place, Gilsland.
G—J. HALLOWAY, 52, Castle Street.

Carnarvon.

F—J. C. ROWLAND, 17, Castle Street
F—D. JONES, Bangor Street.

Carshalton (Surrey).

F—F. CARTER, High Street.

Castleford (Yorks.)

F—H. S. McHUGH, Bridge Street.

Chapel-en-le-Frith.

F—J. F. GRAY, chemist.

Chatham.

F—HENRY WATTS, 68, High Street (opposite Post Office).
Thomas, Paget, and Ilford plates. Papers. Chemicals. Requisites. Some apparatus.
F—A. W. MORGAN, 7, Railway Street.

Chelmsford.

F—F. H. DENNIS, 20, High Street.
Ilford plates and papers. Good stock of chemicals, requisites, and apparatus.
F—J. TOMLINSON, chemist.

Cheltenham.

G—GREENWAY BROS., 339, High Street.
Ilford plates up to $\frac{1}{4}$-plate size.
F—THOMAS BROS., College Pharmacy.
F—BEETHAM & SONS, chemists.
W. M. BELL, 8, Colonnade.

Chepstow.

G—E. BALLARD, 10a, Welsh Street.
Ilford plates up to 12 × 10. Usual chemicals.
F—H. A. WILLIAMS, chemist.

Chertsey.

H—CROSS, chemist.

Chester.

E—GEO. KEMP, 59, Bridge Street.
Paget, Wratten, Thomas, Barnet, Ilford and Mawson plates. All kinds of papers, chemicals, requisites and apparatus.
F—J. H. SPENCER, 36, Bridge Street.
Thomas, Mawson, Paget and Ilford plates. Papers. Chemicals. Apparatus.

Chesterfield.

F—SAMPSON & BARFOOT, chemists, 7, Market Place.
Ilford plates. Papers. All usual chemicals. General stock of apparatus.

F—GEO. WRIGHT, Cavendish Street.
Plates. Papers. Chemicals. Requisites. Apparatus.

Chichester.

F—E. A. LONG, chemist, 15, East Street.
Marion's and Ilford's plates. Papers. Requisites. Chemicals. Lancaster's apparatus.

F—A. G. EVERARD, chemist, 9, North Street.
Marion, Ilford, and Fry's plates. Papers. Requisites. Chemicals. Good stock of apparatus.

Chippenham.

F—EDGAR NEALE, High Street.
Thomas and Ilford plates. Requisites. Chemicals. Papers.

Chorley.

F—H. R. DARNING, chemist, 8, Pall Mall.
Fry, Ilford, Edwards, Barnet, and other plates. Papers. Requisites. Chemicals. Apparatus.

F—T. L. & W. ALKER, 70, Market Street.
Plates, papers, apparatus, and all materials.

Christchurch (Hants.)

G—ALF. MALLETT, High Street.
Thomas, Ilford, and Britannia plates. Papers and chemicals.

Cirencester.

H—W. GRIFFITHS, 7, Market Place.

Clacton-on-Sea.

G—W. MANN, 2, Pier Avenue.
Ilford plates. Principal chemicals, papers, requisites, and apparatus.

G—F. COLLINS, Royal Bazaar.

Coalville.

F—BRUNT, chemist.

Cockermouth.

G—COOPER BROS., chemists.

Colchester.

F—J. C. SHENSTONE, 13, High Street.
Ilford and Paget plates. Good assortment of material and oddments.

Colne.

F—JOSHUA DUCKWORTH, Cloth Hall.
Fry, Ilford, and Thomas plates. Chemicals and all requisites. Apparatus.

H—W. ASQUITH, Market Street.

Cookstown.

G—A. CHARLES, 42, James Street.

Cork.

F—BAKER & WRIGHT, 48, Patrick Street.
Paget, Ilford, Thomas, and Edward's plates. Eastman's films. Papers. Requisites. Chemicals.
F—R. SUMNER, 31, Patrick Street.
F—KILOH & Co., Limited, 108, Patrick Street.

Coventry.

J—HENRY GLOVER, chemist, 68-9, Spon Street.
Plates and chemicals. Apparatus repaired.
F—WYLEYS Limited, chemists.
F—W. CLARKE, Cross Cheaping.
G—J. H. BLUNT, 9, Broadgate.

Crewe.

F—E. BOOTH, Chester Bridge.
Leading makes of plates and all requisites.
H—LAING, 8, Victoria Street.

Crewkerne.

H—J. MUNFORD, Market Square.

Cromer.

F—S. MACK, Church Street.
Four makes of plates. Papers. Requisites and chemicals.

Crowthorne (Berks.)

F—F. SATCHELL, chemist.

Crowle.

F—PICKERING WADE, Market Place.

Croydon.

F—W. J. BISHOP, 74, George Street.
F—W. C. PHILLIPS, 3, Southend.
G—HIRST & Co., St. Michael's Road.

Dalton-in-Furness.

F—H. ARMISTEAD, Market Street.

Darlington.

F—F. W. COOPER, Ivy House, Bondgate.
Fry, Barnet, Thomas, Ilford, and Paget plates. Eastman films. Papers. Requisites. Chemicals. Good stock apparatus.
F—JAMES ROBINSON, chemist, Northgate.
Thomas, Mawson, Ilford, Cowan, Castle, Britannia, and Barnet plates. Chemicals, papers, requisites, and apparatus of every description.

Dartford.

G—HORRELL & GOFF, chemists.

Dartmouth.

F—H. HUMPHREY, 2, Fairfax Place.
G—H. M. HADFIELD, The Quay.

Darwen.

F—R. SHORROCK, chemist, 6, Market Street.
Ilford plates. Chemicals.

Dawlish.

G—CHAPMAN & SONS.

Deal.

G—H. FRANKLIN, 3, High Street.

Deptford.

F—LOCKYER, 88, Evelyn Street.

Derby.

F—STATON & COOPER, 15, Cheapside.
E—THE GENERAL STORES, 30 to 33, Victoria Street.
Edwards, Thomas, Wratten, Star, Paget, Morgan & Kidd, Barnet, Ilford, Fry and Mawson plates. All descriptions of materials.
F—D. W. BARDILL & Co., Limited, 46, St. Peter's Street.
Marion and Ilford plates. Papers. Requisites. Chemicals.
E—RICHARD KEENE, Iron Gate.
About eight of the best makes. Eastman films. All papers, requisites, chemicals, and apparatus.
F—BLUNT & EVANS, chemists.
G—F. W. LANCASTER, Derwent Street.

Devizes (Wilts).

ED. HILL, chemist 25, The Brittox.
Ilford and Castle plates. Papers. Chemicals.

Devonport.

F—F. J. RYALL, 40, Portland Road, Stoke.

Dewsbury.

F—JAS. DONBAVAND, Market Street.
Elliott, Ilford, Thomas, and Mawson plates. Papers. Chemicals. Sundries.

Doncaster.

F—DUNHILL & STILES, chemists, 2, French Gate.
Thomas, Ilford and Wratten's plates. Papers. Requisites. Chemicals. Apparatus.
F—W. J. HART, 21, Cemetery Road.
F—HOWORTH & PARKIN, Market Place.

Dorchester.

F—ALF. H. EVANS, chemist, two doors below King's Arms.
Ilford plates. Papers. Requisites. Chemicals and apparatus.

Douglas (I. of M.)

G—G. H. HORNE.
F—HARRISON'S BOARDING HOUSE, Walpole Avenue.
G—JOHNSON, Castle Street.
F—BREARY & SON, chemists, Prospect Hill.
Thomas, Ilford and other plates. All necessary chemicals, papers, and apparatus.

Dover.

F—J. G. WHORWELL, 7, Bench Street.
Paget, Ilford, and Elliott's plates. All chemicals. Paper requisites. Lancaster's apparatus.
F—W. WYLES, chemist.

Downham Market.

G—F. W. COULSON, 74, High Street.
Ilford plates. Chemicals and sundries.

Drogheda.

F—LUKE J. HEALEY, chemist, 82, West Street.
Marion, Ilford, Paget, and Fry plates.

Dublin.

G—WM. HAYES & Co., chemists, 12, Grafton Street.
Ilford plates and all chemicals.
G—W. R. KENNAN, photographer, 35, Dame Street.
E—J. ROBINSON & SONS, 65, Grafton Street.
E—T. MAYNE, 32, Castle Street.

Dudley.

F—RICHARDSON, Drug Stores.
F—SUPPLY STORES ASSOCIATION, Limited.
F—E. DUNN, 83, High Street.

Dukinfield.

E—WILLIAM JENKINSON, 17, King Street.
Fry, Ilford, Paget, Mawson, Thomas, and Wratten plates. Papers. Full stock of requisites and chemicals.

Dundalk.

F—BACKHOUSE & Co., chemists.

Dundee.

E—PETER FEATHERS, 6, Castle Street.
All leading makes of plates and every requisite.
F—P. A. FEATHERS & SON, 43, Dock Street.
F—EDINBURGH DRUG STORES, 9, Cowgate.
F—A. BIRNIE, 118, Perth Road.

Dunfermline.

G—NORVAL, The Studio.

Duns, N.B.

F—W. GUNN, chemist.

Durham.

F—J. N. WISE, 14, Claypath.
Ilford, Castle, and Verel's plates. Papers. Chemicals. Requisites. Fair stock of apparatus.

F—W. SARSFIELD, 7, Market Place.

Ealing Dean.

F—F. SANQUINETTE, chemist.

F—BARRY & PHILLIPS, High Street.

Eastbourne.

F—F. J. COX, optician, 56, Terminus Road.
Four makes of plates up to ½-pl. size. Ordinary requirements in papers, requisites and chemicals.

F—J. B. FLATMAN, ironmonger, 40, Pevensey Road.
Ilford and Thomas plates. Papers. Full stock chemicals and oddments. Apparatus (hand cameras on hire).

East Dereham.

F—EDWARD PECK, chemist.
All makers' plates up to ½-plate. Papers. Chemicals. Requisites. Apparatus up to 10 × 8.

J—J. H. SKINNER & Co.

East Molesey.

F—J. PARROTT, chemist, Bridge Road.
Thomas, Ilford, Marion, and other plates. Well assorted stock of chemicals, apparatus, and sundries.

Eccles (Lancs.)

F—WM. J. SCHOLES, 130, Church Street.
Ilford plates and preparations. Papers. All chemicals. Apparatus and sundries.

Eckington.

F—H. ROTHERHAM, chemist.

Edinburgh.

F—W. C. CLYNE, 69, Nicolson Street.
Ilford and Thomas plates. Papers. Chemicals and all apparatus.

E—R. H. McBEAN, 25, Albert Place.
All the well-known makes of plates and apparatus.

F—A. D. GUTHRIE, chemist, Bonnington.
Thomas, Ilford, and Verel plates. All ordinary chemicals and sundries.

F—S. KEITH, 69, South Clerk Street.
Thomas, Ilford, and Mawson plates. Papers and requisites.

E—W. HUME, 1, Lothian Street.

E—J. M. TURNBULL, 6, Rose Street.

F—T. MADDOW, 2, Maitland Street.

F—G. CALDER, 13, Lothian Street.
E—A. H. BAIRD, 15, Lothian Street.
F—A. FRAZER, 22, Teviot Place.
F—J. BUIST & SONS, 67, South Bridge.
E—J. BUNCLE, 7, Hope Street.
F—W. FORGAN, 13a, Bristo Place.
E—J. STUART, 34, South Frederick Street.
F—D. McGLASHAN & Co., 60, Daley Road.
F—ADDIE & WEDDERBURN, 17, Hanover Street.
G—J. WALKER, 16, Gladstone Place.

Edmonton.

F—C. COUSINS, Angel Road.

Elgin.

F—SMITH BROS., 122, High Street.
G—A. ANDERSON.

Ely (Cambs).

F—J. E. KNIGHT, High Street.
Ilford, Thomas, and Edwards plates. General stock of requirements Apparatus.

Erith.

H—OLDFIELD & SON, Pier Road.

Esher.

H—E. LONG, chemist.

Eton.

F—W. OLDHAM, 100, High Street.
All kinds of plates. Chemicals and sundries.
F—A. MERRICK, The College.
G—G. P. CARTLAND, High Street.
G—A. D. KISSACK, 130, High Street.

Evesham.

F—PUMPHREY & SON, 23, Port Street.
Various plates. All ordinary chemicals. Papers and requisites. Selection of apparatus.
F—T. E. DOEG, Castle Street.

Exeter.

F—J. H. LAKE, 41, High Street.
Edwards, Ilford, Paget, Mawson and Thomas plates. Good stock papers, requisites, chemicals and apparatus.
F—ERIC LEMMON, 47, High Street.
Ilford plates. Eastman films. Papers. Chemicals. Requisites. Some apparatus.
G—EVANS, GODD & Co., Fore Street.

Exmouth.

G—A. H. TOONE, chemist, 8, Rolle Street.
Ilford plates. Papers. Chemicals and requisites.

Fakenham.

R. A. MEDCALF, Market Place.

Faversham.

H—J. AUSTIN, 5, West Street.
G—W. LAXON, chemist.

Felixstowe.

G—C. B. TYLAR, Victoria Parade.

Filey.

G—WALTER FISHER, near the Crescent.
Ilford and other plates.

Fleet (Hants).

G—J. T. HACKETT, Albert Street.
G—ALBERT GOWEN, chemist, Fleet Road.

Folkestone.

F—GEO. GOODLIFFE, 17, Rendezvous Street.
Ilford, Thomas, Paget, Barnet, and Edwards plates. Papers. Chemicals. General sundries.
F—BISHOP & Co., chemists, Tontine Street.
Ilford and other plates. Chemicals and sundries.
F—RANSFORD, chemist.
G—W. PERRY, Leicester House, Grace Hill.
G—T. M. BRAUND, 9, Church Street.

Forest Gate.

F—CUMINE, 56, Woodgrange Road.
F—HOPPER, 295, Romford Road.

Forest Hill.

G—S. WILLIAMS, 26, Dartmouth Road.
Ilford plates. Papers. Chemicals and sundries.
G—BARTLE, 4, Dartmouth Terrace.

Forfar.

F—G. R. FOWLER, chemist, 38, Castle Street.
Ilford plates. Eastman films. Chemicals. Requisites. Odd apparatus.

Frome.

G—E. C. F. GREEN, chemist, Catherine Hill.
Ilford plates. All chemicals.

Galashiels.

F—J. WALKER, chemist, 50, High Street.
Ilford and Fry plates. Chemicals and materials.

Gainsborough.

—SPOUNCER & SONS, chemists, 16, Silver Street.
Ilford plates. Papers. Chemicals.

G—W. E. WHITE, 7, Market Street.
Ilford plates, ¼ and ½ plate. All ordinary chemicals.

Galway.

G—R. W. SIMMONS, photographer, 26, Dominick Street.
Ilford plates. Usual chemicals.

Gateshead-on-Tyne.

F—B. T. ORD, 182, Redheugh Road, and 38, Derwentwater Road.
Ilford plates. Papers. All chemicals. Requisites.

Glasgow.

F—J. McGHIE, Hazelbank Terrace, Croskell.

E—J. LIZARS, 16, Glassford Street, and 260, Sauchiehall Street.
General photographic dealer. Edwards, Wratten, Ilford, Paget, Mawson, Nameless, Excelsior, and other plates.

E—J. TROTTER, 24, Gordon Street.
All well known apparatus, plates, chemicals, and requisites.

F—J. MORE, optician, 77, Renfield Street.
All the best makers' plates.

G—J. B. CAMPBELL, 163, Renfield Street.

G—M. EDWARDS, 209, Sauchiehall Street.

G—W. REID, 16, Cambridge Street.

F—F. W. VEREL & Co., Cathcart.

JAS. WHITE, 20, Cambridge Street.

G—J. WOOD, 4, St. Enoch Square.

G—WARNEUKE, Sauchiehall Street.

E—G. MASON & Co., 180, Sauchiehall Street.

E—McGHIE & Co., 75, St. Vincent Street.

E—BOLTON & SONS, 47, West Nile Street.

E—ALBION ALBUMENISING Co., 96, Bath Street.

H—J. BROWN, 76, St. Vincent Street.

F—J. STUART Limited, Buchanan Street.

G—ALEXANDER BROS., Renfield Street.

G—GARDNER & LYLE.

Glossop.

F—A. P. GOLDEN, 48, High Street.
The leading brands of plates. Papers. Chemicals and Requisites.

Gloucester.

F—E. G. HUGHES, 86, Northgate Street.
Mawson, Ilford and Barnet plates.

F—W. WALWIN, chemist, Southgate Street.
Barnet, Ilford, Thomas, Edwards, Mawson, Fry's and Paget plates. Good variety of requisites and apparatus.

F—R. C. HUMPHREY, chemist, 83, Barton Street.
Ilford, Marion, Thomas and other plates. Sundries. Chemicals. Apparatus.

G—A. H. PITCHER, 58, Southgate Street.
Plates, papers and apparatus.
G—T. H. BURR, 137, Westgate Street.

Goole.

F—W. H. BUCK, 16 and 18, Ouse Street.
Thomas, Fry, and Ilford plates. Papers. All chemicals and requisites. Apparatus.
F—J. T. BENTLEY, 39, Aire Street.

Gorleston.

F—J. LIFFEN, 6, Piercliffe Terrace, Cliff Hill.
Imperial, Thomas, and Fry plates. Papers. Chemicals. Requisites. Apparatus.
F—W. HINDLE, chemist.

Gosport.

F—E. S. BALCHIN, 83, High Street.
F—FRENCH, North Street.

Grantham.

F—BRIGG & GAMBLE, High Street.
Ilford, Barnet, and own make of plates. All materials and chemicals.

Gravesend.

F—E. MILLHOUSE, 26, New Road.

Greenock.

F—J. GRAHAM, 19, Cathcart Street.

Greenwich.

F—LEO. ATKINSON & Co., 193, Greenwich Road.
Mawson, Fry, Ilford, Thomas, Edwards, Verel and Paget plates. All necessary materials and accessories. Apparatus.

Grimsby.

F—J. H. BOWMAN, 89, Cleethorpes Road.
H—J. W. WHARTON, 67, Freeman Street.

Guernsey.

F—H. CUMBER, jun., chemist, 4, Fountain Street.
Ilford, Paget, Thomas and Marion plates. Papers. Chemicals. Requisites.
G—J. CARRÉ, 46, Bordage Street.

Guildford.

F—E. W. MARTIN, 68, High Street.
Mawson, Ilford, and other plates. Papers and requisites.

Halifax.

F—C. A. HIGGINS, 7, Bull Green, and George Street.
Ilford, Marion, Thomas, and Mawson plates. Papers. Chemicals. Apparatus (sets).
F—ROBERT BROOK, 8, Central Street.
Castle, Thomas, Ilford, Barnet, and Paget plates. Papers. Chemicals. Requisites. Apparatus.

Hammersmith.

F—CRIPPS & Co, King Street.
F—H. R. PROCTOR, 113, The Grove.

Hanley (Staffs).

G—H. J. GOVER & Co., 29, Piccadilly.
Two or three makes of plates, chemicals and requisites.
F—J. W. MOORE, 7, Market Square.
F—T. & G. PACKER, 48, Trinity Street.
F—W. SCARLETT, Brunswick Street.
G—J. H. WALDRON & Co., 79, Broad Street.

Harrow.

F—S. J. GUNN, chemist.
F—J. A. SMITH, watchmaker.

Harrogate.

F—HOLROYD, 1, James Street.
F—F. PERKINS, 22, James Street.
F—ROBINSON, Cambridge Street.
H—A. M. YOUNG.

Hartlepool.

F—J. HORSLEY, 104, High Street.
H—J. C.WINN, chemist.
F—A. BROOKER, chemist, 52A, Robertson Street, corner of Cambridge Rd.
Ilford up to 12×10, Paget, Barnet, Thomas, and Edwards plates
All requirements in chemicals, materials, and sundries.

Havant.

J—W. SCORER, North Street.
Two or three makes of plates. Chemicals and variety of materials.

Hawick.

G—WILSON & ROBINSON, Exchange Arcade.

Hay.

H—J. L. DAVIES, chemist.

Helensburgh.

F—J. McMURRAY, chemist, 13, Westclyde Street.
Marion and Ilford plates. Chemicals and developers.

Hemel Hempstead.

F—C. E. WILKINSON, High Street.

Hereford.

F—W. E. HAINES, 36, High Town.
Edwards, Fry, Ilford, and Thomas plates. All requisites and sundries.
F—H. S. PEARMUND, chemist, 7, Eign Street.
Ilford, Marion, and Thomas plates. Papers. Chemicals and all requisites. Apparatus.

Hertford.

F—THE HERTFORD PHARMACY, 37, Fore Street.
Marion, Ilford, and Thomas plates. Papers, chemicals, and requisites.

Hexham.

F—GIBSON & SONS, chemists, Fore Street.

High Wycombe.

G—J. WILFORD, chemist, 7, High Street.
Ilford plates. Papers. Chemicals. Small requirements.

Horncastle.

G—CARLTON & SONS, 4, High Street.

Horsham.

F—H. W. BRASSINGTON, 26, West Street.
Paget, Mawson, Thomas, and Ilford plates. Papers. Requisites. Chemicals. Apparatus.

Hounslow.

F—W. HAM, 76, High Street.

Howden (East Yorkshire).

G—R. J. LATHAM, Market Place.
Barnet, Ilford, Marion, and Thomas plates, up to $8\frac{1}{2} \times 6\frac{1}{2}$.

Huddersfield.

F—W. F. PIGGOTT, 37, King Street.
Barnet, Ilford, and Thomas plates. Chemicals. Papers. Requisites. Apparatus.
F—J. R. DORE, 26, New Street.
All best makes of plates and every photographic requisite.
F—SMITH & ASHMAN, 20, John William Street.
G—F. H. HEATH, 34, Buxton Road.
G—R. FITTON, New Street.
J—J. A. SYKES, Albert Terrace.
J—E. DYSON, 46, Water Street.

Hull.

F—C. P. GIBSON, 16, Whitefriargate.
Edwards, Fry, Ilford, Paget, and Thomas plates. Eastman films. Requisites. Papers. Chemicals. Apparatus.
H—LOFTHOUSE & SALTMER, 17, Market Place.
F—A. FRANKS, 60, Whitefriargate.
G—J. B. MARSDEN, 30, Blanket Row.
G—J. THYER, 42, Chariot Street.

Hyde.

F—G. F. WILD, Clarendon Place.
F—C. BANCROFT.

Hythe.

H—J. V. COBB, chemist.

Ilfracombe.

F—C. THORNLEY, 23, High Street.
Ilford and Paget plates. Papers. Requisites Chemicals.
E—E. D. PERCIVAL, Catford's Art Galleries, 5, High Street.
Good stock of all materials by best makers.
G—TWISS & SONS, The Arcade.
Ilford, Marion, and Edwards plates. Papers. Requisites. Chemicals.
F—F. KEAL, 33, High Street.

Inverness.

F—WILLIAM OGSTON, 18, Union Street.
Ilford plates. Papers. Requisites. Chemicals.
F—W. J. BETHUNE, chemist, 99, Academy Street.
Ilford plates. Papers. Requisites. Chemicals.

Ipswich.

F—WIGGIN & SON, 34, St. Matthew's.
Barnet, Fry's, Ilford, and Thomas plates. Papers. Requisites. Chemicals. Apparatus (complete sets).
F—W. H. MARSH, chemist, 3, Upper Brook Street.
Ilford, Paget, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
G—A. H. CADE, Cornhill.

Jarrow-on-Tyne.

F—WILLIAMSON & Co., chemists, Ellison Street.
Mawson, Ilford, Thomas, England, and Marion plates. Papers. Requisites. Chemicals.

Jersey.

F—F. G. DE FAYE, chemist, 21, David Place, two doors from Royal Hotel.
All leading makes of plates. Papers. Requisites. Chemicals. Good stock of apparatus.
F—J. T. BAKER, 27, Halkelt Place.
Ilford, Marion, Paget, and Thomas plates. Papers. Requisites. Chemicals.
H—J. RENOUF, jun., 45, Don Street.
G—P. GODFRAY, 35, Belmont Road.

Keighley.

F—A. N. KERSHAW, Corn Mill Bridge.
Ilford, Thomas and Waterloo plates. Papers. Requisites. Chemicals. Apparatus.
F—JOHN SNEED, 2, High Street.
Barnet, Ilford and Castle plates. Papers. Requisites. Chemicals. Apparatus.
F—ALEX. JENNINGS, Cavendish Street.
F—D. WEST, 15, High Street.
F—W. H. KERSHAW, 40, Low Street.
F—W. COOKE, Earl Street.

Kendal.

F—G. F. RIGG, 43, Finkle Street.
Edwards, Ilford, Marion, Paget and Thomas plates. Papers. Requisites. Chemicals. Small stock of apparatus.
F—SEVERS & BATESON, 23, Strickland Gate.
Alliance, Edwards, Ilford, Mawson and Marion plates. Papers. Requisites. Chemicals.
F—J. H. HOGG, 71, Strickland Gate.
G—T. HALLIWELL, Aynan Road.

Kenilworth.

G—W. KIMBERLEY, photographer.

Keswick.

F—H. McDONALD.
G—A. PETTITT, The Art Gallery.

Kettering.

F—J. R. MOORE, chemist, corner of Gold and Silver Streets. Ilford plates. Papers. Requisites. Chemicals. Lancaster's apparatus.

Kidderminster.

F—R. JENKINS, 15, Mill Street. Edwards, Ilford, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
G—T. R. BRUMMITT, 76, Worcester Street. Two makes of plates. Papers. Few requisites.

Kingston.

H—W. BREWSTER, Market Place.

Kirkby Lonsdale.

F—C. PARKER, chemist.

Kirkcaldy.

F—D. STORRAR, chemist, 228, High Street. Three or four makes of plates. Papers. Requisites. Chemicals.

Kirn (Args.)

G—G. STIRLING, Alexandra Place.

Knaresborough.

F—G. THOMPSON & SOUTHWELL, High Street.

Lancaster.

G—DAVIS & SONS, 23, New Street.
Ilford, Barnet and other plates. Papers. Requisites. Chemicals. Apparatus.
F—W. BRIGGS, chemist, 21, Cheapside.
Fry, Ilford, Mawson and Thomas plates. Eastman films. Papers. Requisites. Chemicals. Some apparatus.
F—VINCE & Co., Cheapside.

Landport.

F—H. C. HAGGIS, chemist.

Largs.

F—W. G. STORY, photographer, Bath Street.
Several makes of plates. Papers. Requisites. Chemicals.

Leamington.

F—C. DAVIS, 90, Warwick Street.
Fry, Ilford, and Mawson plates. Papers. Requisites. Chemicals.
F—SMITH & SON, 102, Parade.
Edwards, Castle, Fry, Thomas, Paget, and Ilford plates. Papers. Requisites. Chemicals.
F—JUDD & Co., 40, Bath Street.
Barnet, Ilford, Marion, and Thomas plates. Papers. Requisites. Chemicals. Lancaster's apparatus.
F—BURGIS & COLBOURNE.
G—R. L. GRAHAM, 6 & 8, The Parade.
G—COUNTY DRUG STORE, 4, Bath Street.

Ledbury.

H—V. W. MEACHAM, High Street.

Leeds.

E—PEARSON & DENHAM, 5, New Station Street.
E—REYNOLDS & BRANSON, 14, Commercial Street.
E—C. C. VEVERS, 12, Market Street, Briggate.
F—R. H. WHITE, 18, Park Row.
G—F. WALTON, New Briggate.
F—A. SCOTT, 5, Woodhouse Lane.
F—J. W. SUTCLIFFE, Long Row, Horsforth.

Leek.

G—JOHNSON & SONS, 5, Stanley Street.
Ilford Plates. Papers. Requisites. Chemicals.
H—CHATWIN & Co.

Leicester.

E—R. BROOF, 66, Belgrave Gate.
Various makes of plates. Papers. Requisites. Chemicals. Apparatus.
H—J. YOUNG, 16, Gallowtree Gate.
S. WAND, 18, Haymarket.
F—H. PICKERING, High Cross Street.

Leigh (Lancs.)

F—WM. HAMPSON, 57, Chapel Street.
Ilford and Mawson plates. Papers. Requisites. Chemicals. Apparatus.

Leighton Buzzard.

H—T. G. PIGGOTT, High Street.

Lerwick (Shetland).

F—A. L. LAING, chemist, 101, Commercial Street.
Mawson and Ilford plates. Papers. Requisites. Chemicals.
G—ROBERT H. RAMSAY, Charlotte Street.
Castle plates.

Lewes.

H—D. BLAGROVE, 73, High Street.

Lewisham.

F—J. McLANACHAN, 231, High Street.

Leytonstone.

F—J. J. FERGUSON, chemist, Cann Hall Road.
Edwards, Ilford and Paget plates. Papers. Requisites. Chemicals. Apparatus (sets).
F—MATTHEW & SON, The Grove.

Lincoln.

F—J. T. BIRKBECK, 5, Bailgate.
Barnet, Castle, Ilford and Paget plates. Papers. Requisites. Chemicals.
H—C. C. SMITH, Norman Place.
F—BATTLE, SON & MALTBY, druggists.

Liverpool.

E—WOOD BROS., 73, Lord Street.
Edwards, Ilford, Paget, Mawson, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
F—J. HAIGH, 77, Dale Street, and 95, Lord Street.
Thomas and Ilford plates. Papers. Requisites. Chemicals. Apparatus (special makes).
G—STREET & Co., 63, Bold Street.
Photo printers, &c. Dealers in mounts, sensitised paper, &c.
F—CHADBURN & SON, 11, Waterloo Road.
E—J. J. ATKINSON, Manchester Street.
F—ARCHER & SONS, 43, Lord Street.
E—SHARP & HITCHMOUGH, 101, Dale Street.
F—J. J. WOOD, 20, Lord Street.
E—F. A. LLOYD, 5, South John Street.
F—WOOD, 17, Lord Street.
F—H. G. LEWIS & Co., 31, Bold Street.
G—P. CHAMBERS, 17, Lodge Lane.
G—B. COULIN, Mount Pleasant.
F—J. WOOD, 118, Northbrook Street.
F—PARRY & Co., 11a, Renshaw Street.
G—J. W. TURNER, 9a, Parr Street.
G—SYMES & Co., Hardman Street.

Llandudno.

F—G. BROOKES, chemist.
G—A. KENNERLEY, 3, Ty Gwyn Road.
G—J. SLATER, Central Mostyn Street.

Llanelly.

F—J. W. JONES, chemist, Stepney Street.

Llangollen.

G—E. LETSOME, Victoria Place.

London, E.

G—W. R. BARNES, 10, Terrace Road, Upper Manor.
F—RILEY & SON, 249, Commercial Road.
F—ALLEN, 10, Barking Road, Canning Town.
G—HATFIELD & SON, 817, Commercial Road.

London, E.C.

E—T. & H. DOUBLET, 11, Moorgate Street.
All brands of plates. Papers. Requisites Chemicals. Apparatus.
F—W. H. HARLING, 47, Finsbury Pavement.
Edwards, Fry, Ilford, Paget, and Thomas plates. Papers. Ordinary requisites. Chemicals. General Apparatus.
F—PENROSE & Co., 5, Amwell Street, Myddleton Square.
Various plates. Papers. Requisites. Chemicals.
E—ADAMS & Co , 81, Aldersgate Street.
G—DOLLAND & Co., 30, Ludgate Hill.
,, ,, 62, Old Broad Street.
F—H. HUGHES & SON, 59, Fenchurch Street.
F—J. ORME & Co., 65, Barbican.
E—WHITTINGHAM & Co., 43, Charterhouse Square.
,, ,, 91, Gracechurch Street.
F—W. D. NORTH, 97, City Road.
G—JOHN PIGGOTT, 117, Cheapside.
E—E. G. WOOD, 74, Cheapside.
E—LONDON STEREO Co.
E—MAYFIELD & Co., 41, Queen Victoria Street.
E—C. E. ELLIOTT, 36, Jewin Street.
G—J. HANCOCK, 61, City Road.
E—W. LAWLEY, 78, Farringdon Street.
F—NEW CIVIL SERVICE STORES, 122, Queen Victoria Street.
F—C.S.S.A., 136, Queen Victoria Street.
F—SPIERS & POND, New Bridge Street.
G—ST. BRIDE'S STORES, 86, Fleet Street.
F—AMPHLETT, HUMPHRIES & Co., 13, Edmund Street, Aldersgate Street.
F—NEWTON & Co., 1, Fleet Street.
E—PRICE TALBOT & Co., 26, Ludgate Hill.
E—LEVI & Co., 40, Furnival Street.
E—R. & J. BECK, 68, Cornhill.
F—NEGRETTI & ZAMBRA, Holborn Viaduct.
G—GREEN, 54, Lime Street.
F—G. S. MARTIN, Bream's Buildings, Chancery Lane.
F—J. DOLLAND, 1, Ludgate Hill.
E—BECKER & Co., 33, Hatton Wall, Hatton Garden.
E—H. CROUCH, 66, Barbican.
F—J. W. JONES, 23, Lime Street.

E—PERKEN, SON & RAYMENT, 99, Hatton Garden.
E—OSCAR SCHOLZIG, Dashwood House, New Broad Street.
E—WOOD BROS., 12, Bartlett's Buildings.
J—A. & G. TAYLOR, 78, Queen Victoria Street.
G—A. ARCHER, 48, Lime Street.
G—DARTON & Co., 45, St. John Street.
F—SPICER BROS., Loman Street, Gravel Lane.
F—WOODBURY PERMANENT PRINTING Co., 6, Great New Street.
G—FALCK & Co , 1 and 2, Crown Court, Cheapside.

London, N.

E—F. W. HART, 96, Stoke Newington Road.
Various plates up to 15×12. Papers. Requisites. Chemicals.
F—E. H. FARROW, 474, Hornsey Road.
Ilford plates. Papers. Requisites. Chemicals. Apparatus.
G—E. SCAMELL, 4, Albert Terrace, Church End, Finchley.
England, Ilford, and Paget plates. Papers. Requisites. Chemicals.
F—MEACHER, 294, Seven Sisters' Road.
,, 61, Stroud Green Road.
J—J. BRAINE & SONS, 22, Bedford Terrace, Andover Road, Holloway.
G—J. MARTIN, 4, Park Villas, New Southgate.
F—H. & J. RIGDEN, 4, Wendover Villas, Wood Green.
G—J. W. G. CHIPPER, 39, Highgate Hill.
Ilford plates. Papers. Developers. Second-hand apparatus and requisites.
F—GEO. DANIEL, chemist, 630, Holloway Road.
Edwards, Ilford, Thomas, Mawson, and Marion plates. Papers. Requisites. All chemicals.
E—MORLEY & COOPER, 70, Upper Street, Islington.
E—W. H. HUMPHRIES & Co., 268, Upper Street, Islington.
F—R H. WYNNE, 106, Seven Sisters' Road.
G—J. MOTHERSILL, 60, Holloway Road.
F—HOLMES AND WATSON, 22a, Church Street, Islington.
F—G. W. SECRETAN, 210, Tufnell Park Road.
F—W. H. PRESTWICK, High Road, Tottenham.
G—HOCKET & Co., Henry Road, Barnet.
G—FELLOWS, Old Court House, Enfield.

London, N.E.

F—A. BECKETT, photographer, 6, The Grove, Hackney.
Three or four makes of plates. Papers. Requisites. Chemicals. Fair stock of apparatus.
F—W. SHARMAN, 247, Mare Street, Hackney.
Castle, Fry, Edwards, Ilford, Thomas, and Wratten plates. Papers. Requisites. Chemicals. Apparatus.
F—G. PASCO & SON, chemists, 57, Hackney Road.
Edwards, Fry, Ilford, and Thomas plates. Papers. All small requisites. Chemicals.

London, N.W.

F—A. R. LAMBE, 245, High Road, Kilburn.
Edwards, Ilford, Fry, Paget, Thomas, and Marion plates up to 12 × 10. Papers. Requisites. Chemicals. Apparatus.

G—G. A. HODGKINSON, 9, Chapel Street, Somers Town.
Ilford plates. Papers. Requisites. Chemicals.

F—G. H. CARTER, 65, Torriano Avenue, Kentish Town.
Fry, Ilford, and Thomas plates. Papers. Requisites. All ordinary chemicals. Apparatus.

F—J. SALMON, 169, Hampstead Road.

F—T. NEWTON, Carlton Road, Kilburn.

F—E. PETTINGER, 49, High Street, Hampstead.

G—A. RIVOT & Co., Willesden Green.

G—HAYTER, 387, Kentish Town Road.

London, S.E.

E—BUTCHER & SONS, Tranquil Vale, Blackheath.
All makers' plates, and all sizes. Papers. Requisites. Chemicals. Apparatus.

F—HOWELL & SON, 81, High Street, Peckham.

F—BALDOCK & Co., 3, High Street, South Norwood.
Ilford, Marion, Paget, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.

F—McCARTHY, 879, Old Kent Road.
Ilford and Thomas plates.

E—A. E. WADE, 177, Walworth Road.
All kinds of plates. Papers. Requisites. Chemicals.

J—W. T. SLATER, 169, Southampton Street, Camberwell.

F—PROSSER, ROBERTS & Co., 13, Church Street, Camberwell.

E—W. F. STANLEY, Railway Approach.

F—LOCKYER BROS., 88, Evelyn Street, Deptford.

F—H. SENIER & Co., 88, Norwood Road.

F—T. R. PRIME, Upper Norwood.

F—C. E. DALE, Upper Sydenham.

F—LEO ATKINSON & Co., 285, Brockley Road.

F—MOODY & CATHERNS, 30, Church Street, Camberwell.

F—BELL & FREKE, 268, Coldharbour Lane.

F—W. TYLAR, 48, Waterloo Road.

F—J. D. PIDGEON, High Road, New Cross.

F—T. BROMWICH & Co , 69, New Road.

E—BLACKFRIARS PHOTO Co., 1, Surrey Row, Blackfriars Road.

F—T. H. POWELL, 116, Denmark Hill.

F—NOAKES & SON, Nelson Street, Greenwich.

F—MEDLAND, High Street, Borough.

F—HUNT & THORNTON, 327, Lordship Lane.

F—BROOKS, High Street, Deptford.

F—EAMES & BYWATERS, High Road.

F—HICKS, 291, New Cross Road.

G—HUDSON, 15, Stockwell Street, West Greenwich.

G—ROBESON, 7, New Cross Road.

G—J. G. ATKINSON, 25, Weston Hill, Upper Norwood.

London, S.W.

F—J. H. READ, chemist, 11, Buckingham Palace Road.
Various plates. Papers. Requisites. Chemicals.

F—WEBSTER BROS., The Pavement, Clapham Common.
Fry, Ilford, Paget, Thomas, and Marion plates. Papers. Requisites. Chemicals. Apparatus (special makes).

F—CLARKE & CLARKE, Clapham Junction.
Barnet, Fry, Thomas, Ilford, Verel, Express, Mawson, and Paget plates. Papers. Requisites. Chemicals.

E—THOMAS & Co., 10, Pall Mall.

F—F. H. GLUE, 156, Clapham Road.

F—ARMY & NAVY AUXILIARY STORES, Francis Street.

F—HARROD'S STORES, Brompton Road.

F—JUNIOR ARMY & NAVY STORES, Waterloo Place.

F—CIVIL SERVICE CO-OPERATIVE SOCIETY, 28, Haymarket.

G—S. H. R. SALMON, 10, The Terrace, East Putney.

G—WATSON BROS., 4, Pall Mall.

F—PRICE & WARDLE, 290, Brixton Road.

G—H. VALENTINE & Co., 88, Brixton Road.

G—EVANS, Old Kent Road.

G—POOLE, Putney.

G—BULL, Lavender Hill.

G—J. LUXMORE, St. John's Road.

G—R. LUXMORE, Battersea Park Road.

G—BARTLETT, High Street, Battersea.

G—SLADE, St. John's Hill.

G—CHURCHILL, Clapham Old Town.

G—VICTORIA PHOTO DEPÔT, Queen's Road.

G—BELL, CHESSHIRE & FREKE, 878, Coldharbour Lane.

London, W.

F—J. ROWLEY & SONS, 60, Edgware Road.
Fry and Ilford plates. Papers. Requisites. Chemicals.

F—C. W. BRUMWELL, 7, Lower Terrace, Notting Hill.
Ilford (up to 15 × 12), Castle, Fry, Paget, and Thomas plates. Papers. Requisites. Chemicals. Moderate stock of apparatus.

F—A. Le CLAIRE, jeweller and optician, 67, Praed Street.
Various plates. Papers. Requisites. Chemicals.

F—W. A. SHEPHARD, 155, King Street West, Hammersmith.

F—J. FALLOWFIELD, 146, Charing Cross Road.

E—ROSS & Co., 112, New Bond Street.

F—WHITELEY, Westbourne Grove.

E—LONDON STEREO Co., 106, Regent Street.

F—J. CHILWELL, 452, Oxford Street.

G—WEBSTER BROS., 4, Porchester Road.

F—HORNE & THORNTHWAITE, 416, Strand.

E—ROBINSON & SON, 172, Regent Street.

E—J. WERGE, 11A, Berners Street.

E—J. F. SHEW & Co., Newman Street, Oxford Street.

E—SWIFT & SON, 81, Tottenham Court Road.

F—THEOBALD & Co., 7, Bath Place, Kensington.
E -EASTMAN Co., 115, Oxford Street.
G—CRIPPS & CULLINAM, 155, King Street, Hammersmith.
G -ENGLAND BROS., 21, Charles Street, Notting Hill.
G -HELIOS Co., Great Portland Street
G YORK & SON, 17, Lancaster Road, Notting Hill.
G -OFFELEIN & Co., 54 Berners Street.
G—J. BLUNDELL, 162, Wardour Street.
G—W. DEE & Co., 239, Hammersmith Road.

London, W.C.

E -PARKER & Co., 288, High Holborn.
Most makes of plates. Papers. Requisites. Chemicals. Apparatus.
F—DRING & FAGE, 145, Strand.
Various plates. Papers. Requisites. Chemicals. Apparatus.
E—ADAMS & Co., 26, Charing Cross Road.
E—HOUGHTON & SON, 85, High Holborn.
E—WATSON & SON, 313, High Holborn.
F—C. S. S. A., Chandos Street.
F—HINTON & Co, 38, Bedford Street, Covent Garden.
E -GRIFFEN & SON, 22, Garrick Street, Covent Garden.
E -MARION & Co., 23, Soho Square.
E -ROUCH & Co., 180, Strand.
E—E. OSBORNE, Red Lion Square.
E -SANDS & HUNTER, 20, Cranborne Street.
F -JOHN BROWNING, 63, Strand.
E -WRATTEN & WAINWRIGHT, 38, Great Queen Street
E—W. CHAMBERS, 3, Featherstone Buildings, High Holborn.
F -NEGRETTI & ZAMBRA, Holborn Viaduct.
F -C. PEXTON, 22, Gray's Inn Road.

Londonderry.

G -MAXWELL GREER & Co., Foyle Street.
Chemicals only.
G -R. SMITH & Co., 65, Foyle Street
Ilford plates. Papers. Requisites. Chemicals.

Loughborough.

F—R. SCRASE, 9, Church Gate.
Ilford and Thomas plates. Papers. Requisites. Chemicals.
F—W. F. CHARLES, 38, Market Place.

Louth.

F—MARK SMITH, chemist.

Lowestoft.

F—J. W. D. HUME, The Grove Pharmacy.
Ilford, Marion, Mawson, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
F—A. WRIGHT, High Street.
F -G. RAYSON, 2, Commercial Street.

Ludlow.

F—G. WOODHOUSE, 45, Bull Ring.
Ilford all kinds, few Fry and Thomas plates. Papers. Requisites. Chemicals.
G—J. JONES, photographer, 51, Broad Street.
Marion, Castle, and Thomas plates.

Luton.

F—WOOTON & WEBB, chemists, Market Place.
Fry, Ilford, Thomas, Marion, and Wratten plates. Papers. Requisites. Chemicals.
F—W. T. ROBERTS, 44, Church Street.
Ilford, Thomas, and Paget plates. Papers. Requisites. Chemicals.
H—SPRATLEY, Bull Street.

Lynmouth.

F—VICKERY BROS., The Studio, Watersmeet Road.
Ilford plates, all sizes. Papers. Requisites. Chemicals. Apparatus for hire.
G—GOODACRE BROS., Watersmeet Road.

Lynn.

F—W. H. COCKLE, 59, High Street.
Edwards, Fry, Ilford and Paget plates. Papers. Requisites. Chemicals. Apparatus.
F—W. J. PALMER, 90, Norfolk Street (near the Station).
Ilford and other plates. Papers. Chemicals.

Lytham.

F—TOMLINSON, Warton Street.

Macclesfield.

F—J. HODKINSON, 101, Mill Street.
Several makes of plates. Papers. Requisites. Chemicals.
G—W. J. BATES, 116, Mill Street.
G—R. WOODGATE, 10, Market Place.

Maidenhead.

F—A. UPSON, chemist, 35, High Street.
Ilford plates. Papers. Requisites. Chemicals. Apparatus.

Maidstone.

F—F. R. JENNINGS, 7, London Road, and 85, Week Street.
Ilford (to 12 × 10), Edwards, and Marion plates. Papers. Requisites. Chemicals. Apparatus.
F—PANKHURST & Co., 18, Gabriel's Hill.

Malton.

F—G. J. JONES, bookseller, Wheelgate.
Ilford, Britannia, Mawson, and Wratten plates.

Malvern.

G—W. & J. BURROW, The Devereux Gallery, Belle Vue Terrace.
Ilford chiefly, but small stocks of Fry and Thomas plates as well. Papers. Chemicals. Oddments. Some apparatus.
G—C. J. & E. GROSVENOR, 3, Belvoir Terrace, Cowleigh Road.
Ilford plates. Papers. Chemicals.
F—THE DRUG STORES, Church Street.

Manchester.

F—A. BUSHBY, 41, Stockport Road.
Castle, Ilford, Thomas, and Fry plates. Papers. Requisites. Chemicals. Apparatus (special makes).
E—LEATHER & PETTY, 12, Lancaster Avenue, Fennel Street.
Barnet, Castle, Ilford, Mawson, and Paget plates. Papers. Requisites. Chemicals.
F—E. W. JACKSON, 71, Oxford Street.
Ilford, Thomas, and other plates. Every requisite.
F—ARMSTRONG & BRO., 88, Deansgate.
F—M. POGSON, 72, Market Street.
E—J. T. CHAPMAN, Albert Square.
E—HOLMES, SADDLER & HOLMES, 24, South Hall Street,
F—WOOLEY, SONS & Co.
E—W. I. CHADWICK, 2, St. Mary's Street.
E—O. J. WEAKLEY, 87, City Road.
F—E. WARD, 249, Oxford Street.
F—A. FRANKS, 95, Deansgate.
F—CORNBROOK DRUG STORES, 307, Chester Road.
F—J. BIDDLE, 97, Medlock Street, Hulme.
J—THORNTON-PICKARD MANUFACTURING Co., St. Mary's Street.
F—HUDDLESTONE & SONS, 68, Lower Broughton Road.
F—J. L. SMITH, 311, Chester Road.
F—BURRY & SMITH, 45, Market Street.

Mansfield.

F—AGAR BROS., 14, West Gate.
Ilford plates. Papers. Requisites. Chemicals. Some Apparatus.

March.

H—P. H. DAVIES, chemist.

Margate.

F—W. S. HARVEY, 20, Market Place.
Edwards, Fry, Ilford, Paget, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
F—G. E. HOUGHTON, The "Stodart" Studio, Fort Road.
Five or six makes of plates. Papers. Ordinary requisites. Usual chemicals.
G—HUBBARD & SONS, Zion Place.
G—WOOTTON & SON, High Street.

Marlborough.

H—W. W. GREGORY, High Street.

Matlock Bath.

F—J. S. HODGKINSON, chemist.

Melbourne (Derby).

H—W. COXON, High Street.

Melton Mowbray.

F—MILNER, Cheapside.

Merthyr.

F—M. E. STEPHENS, 113, High Street.
G—HARRIS, SON & Co., 88, High Street.

Mexborough.

R. J. SHIELDS, 156, High Street.

Middlesbrough.

F—J. C. ROBSON, 37, Linthorpe Road.
F—R. HALL, Maston Road.
F—P. J. HARRINGTON, Newport Road.

Midhurst.

F—THOS. MAIDES, West Street.
H—F. COZE.

Milnrow.

F—DRUG STORES, 41, Dale Street.

Mirfield.

F—C. CROOK, Easthorpe.
Ilford plates. Papers. Requisites. All chemicals.

Montrose.

F—ALEX. DAVIDSON, chemist, 172, High Street.
Edwards, Ilford, Mawson, and Paget plates.

Nantwich.

F—WOOLSTENCROFT, 14, Hospital Street.

Neath.

H—J. G. ISAACS, chemist.

Nelson.

F—S. JESSOP, 96, Manchester Road.

Newark.

F—J. H. SMITH, chemist, Bridge Street.
Fry and Ilford plates.
F—H. FISHER, 26, Stodman Street.
F—HALTO, Bridge Street.

New Brighton.

F—C. WATKINS, Victoria Road.

Newbury.

H—FIELDER & Co., 103, Northbrook Street.

New Eltham (Kent).

F—LOCKYER, The Parade.

Newcastle-on-Tyne.

E—F. K. HURMAN & Co., 2, St. Nicholas Buildings.
F—J. WATSON, chemist, 34, Grainger Street.
F—WILKINSON & SIMPSON, chemists, 24, Newgate Street.
F—SINCLAIR, 51, Cromwell Street.
F—J. ROBERTS, 1, New Bridge Street.
F—P. HALL, chemist, 118, Grey Street.
E—MAWSON & SWAN, 11, Moseley Street.

Newcastle (Staffs.)

F—G. T. BAGGULEY, bookseller.
Fry and Ilford plates. Papers. Requisites. Chemicals. Lancaster's apparatus.

Newmarket.

G—H. R. SHERBORN, High Street.
Ilford, Marion, and Paget plates. Papers. Ordinary requisites. Usual chemicals.
H—J. RAE, chemist.

Newport (Mon.)

F—A. E. ATKINS, Commercial Street.
F—TOWNSEND CYCLE Co , 113, Commercial Street.
Fry, Edwards, Ilford, Paget, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
G—T. WILKS, 126, Snow Hill.

Newport (I. of W.)

F—CHAS. KNIGHT, 108, High Street.
Britannia, Fry, and Paget plates. Papers. Requisites. Chemicals. Apparatus.
F—ALDERSLADE, chemist.

Newquay (Corn.)

G—F. WARREN, stationer.

Newry.

F—EDGAR, 60, High Street.
F—S. CONNOR, 177, Hill Street.

Newton Abbott.

F—J. H. BIBBINGS, chemist.

Newtown (Mon.)

G—E. OWEN, 48, Broad Street.

Northampton.

F—F. KIRBY, 114, Abington Street.
Ilford, Mawson and Thomas plates, all sizes. Papers. Requisites. Chemicals. Lancaster's apparatus.
F—P. JEYES & Co., 6, Drapery.
F—A. BILSON, 21, Horsemarket.

North Shields.

F—F. IRVIN, chemist, Bedford Street.
Principal makes of plates. Papers. Requisites. Chemicals. Some apparatus.

Northwich.

F—J. W. DEAKIN, 36, Witton Street.
Fry, Ilford, and Thomas plates. Papers. Ordinary requisites. Chemicals. Fair stock of apparatus.

Norwich.

E—A. E. COE, 32, London Street.
Ilford, Mawson and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
F—W. T. DAWSON, chemist, 76, Prince of Wales Road.
Every sundry an amateur may require.
G—FULLER & Co., Rampant, Horse Street.
Various plates. Papers. Requisites. Chemicals.

Nottingham.

E—JAS. TAYLOR, 11, Bridlesmith Gate.
F—A. W. FLOWERDEW, 42, Bridlesmith Gate.
F—SHEPPERLEY, Long Row.
F—C. E. MARSDEN, 14, Denman Street, New Radford.
F—H. W. COWLEY, 18, Alfreton Road.

Nuneaton.

F—HENRY LESTER, chemist, 1, Bridge Street.
Ilford and other plates. Papers. Requisites. Chemicals.
H—ILIFFE & SON, 29, Market Place.

Oban.

F—S. LAWRENCE, chemist, 101, George Street (John Square).
Fry, Ilford, Marion, and Paget plates. Papers. Requisites. Chemicals.

Oldbury (Worces.)

G—F. J. KEEN, Market Place.
Ilford plates. Papers. Requisites. Chemicals.

Oldham.

F—C. G. WOOD, 30, High Street.
Fry, Mawson, Barnet, Thomas, Verel, and Marion plates. Papers. Requisites. Chemicals. Lancaster's apparatus.
F—J. WRIGLEY, 90, Union Street.
F—BRADDOCK & BAGSHAW, 37, Yorkshire Street.
F—S. KNOTT, 55, Yorkshire Street.
G—JACKSON BROS., 2, Clegg Street.

Ormskirk.

F—CAMMACK & SON.

Oswestry.

F—W. GODFREY, Cross Street.

Ottery St. Mary.

F—H. D. BADCOCK, chemist.

Oxford.

F—J. SQUIRE, 41, Queen Street.
H—CLAYTON, chemist.
H—J. C DRUCE, chemist.
F—WILSON, Park End Street.
G—E. SAUNDERS, 100, High Street.
G—GILBMAN & Co., 107, St. Aldate's.
G—E. T. SHELTON, 11, Woodstock Road.

Paignton.

G—J. H. GERMAN, 9, Torbay Road.

Paisley, N.B.

H—R. LOVE & Co , opticians.

Pendleton.

F—RAMSAY KNIGHT, 281, Broad Street.

Penrith.

F—J. COWPER, chemist, 50, King Street.
Various plates to 12 × 10. Papers. Requisites. Chemicals. Apparatus to 8½ × 6½.
F—E. B. GRIERSON, Limited, Corn Market.
The leading makes of plates. Papers. Requisites. Chemicals.
F—C. J. WHITTAKER, Station Road.
G—J. HUFF & SON, 10, Victoria Road.

Penzance.

G—A. H. BUCKETT, 22, Market Place.
Ilford plates. Papers. Requisites. Chemicals.

G—R. H. PRESTON, Photo Studio, 40, Market Place.
Two or three makes of plates, up to 15 × 12. Papers. Chemicals.
F—D. WATSON, 15, Market Place.
G—A. K. BARNETT, Chyandour.

Pershore.

G—WILLIAM DOWTY, chemist and photographer, High Street.
Edwards, Ilford, and Thomas plates. Papers. Chemicals.

Perth.

G—J. CAMPBELL, 41, George Street.

Peterborough.

F—H. E. NOBLE, chemist, New Road.
An all-round stock.
F—J. W. BODGER, chemist, 18, Cowgate.
Barnet, Ilford, and Thomas plates. Papers. Requisites. Chemicals. Apparatus (special makes).
F—STURTON & SONS, chemists.
F—J. H. PEARSON, Market Place.
G—W. C. COLLS, Cowgate.

Petersfield.

F—W. B. EDGELER, chemist.

Plumstead.

F—J. SYKES, 28, High Street.

Plymouth.

F—JOHN HODGE, photographer, 31, Union Street.
Ilford (to 18 × 12), Thomas, and Barnet plates. Eastman films. Papers. Requisites. Chemicals. Apparatus, buying and selling second-hand outfits.
G—HEATH & BULLINGHAM, 16, George Street.
G—W. HEATH, 24, George Street.
H—SKARDON & SONS.

Pontefract.

F—W. R. MAUD, chemist,

Pontypridd.

F—THOS. FORREST, 14, Market Street.

Portland.

G—A. PARSONS, 1, Victoria Buildings.

Portmadoc.

F—T. JENKINS, Medical Hall.

Portsea.

G—J. BAILEY, Queen Street.

Portsmouth.

F—H. SMITH, 31, St. Mary's Street.
F—SYMONDS & Co., 39, High Street.

Preston.

F—W. J. T. JACKSON, 55, Fishergate.
Castle, Ilford, Paget, Thomas, and Verel plates. Papers. Requisites. Chemicals. Apparatus.
F—G. SHARPLES, 7, Fishergate.
F—J. PARKER, 100, Fishergate.
F—DEWHURST, 89, Fishergate.
G—CARTWRIGHT, optician, Fishergate.
G—BARRETT & PARKINSON, 31, Church Street.

Ramsgate.

F—EDWARD BAILEY, 2, Queen Street.
Ilford, Paget, and Thomas plates. Papers. Requisites. Chemicals. Small stock of apparatus.
F—PAVEY & Co., 104, High Street.
G—F. THOMPSON, 15, Queen Street.
G—MORRIS, Assembly Rooms, High Street.

Rawtenstall.

F—J. TAYLOR, Albion House.
F—J. HOLT, Bank Street.

Reading.

F—F. H. DANN, 35, Broad Street.
Mawson, Marion, Paget, Ilford, and Thomas plates. Papers. Requisites. Chemicals. Apparatus (special makes).
H—J. CROSS, 38, Oxford Street.
F—TUNBRIDGE & WRIGHT, 84, Broad Street.

Red Hill.

G—S. PADWICK, Station Road.
Ilford plates.
F—R. W. ROBINSON, Linkfield Corner.

Redruth.

F—W. BRAY, chemist.

Rhyl.

F—E. L. PUGH, 52, High Street.

Richmond (Surrey).

F—BOURN BROS., 5, Hill Rise.
Fry, Ilford, Mawson, Marion, Paget, and Thomas plates. Papers. Requisites. Chemicals. Lancaster's apparatus.
F—A. HORNBY, 50, George Street.
G—MORGAN & KIDD, Kew Foot Road.

Richmond (Yorks).

F—G. R. WALTON & Co., The Pharmacy.
Ilford and Marion plates. Papers. Chemicals.

Ripley (near Derby).

F—W. A. SHEPHARD, chemist.

Ripon.

F—J. W. SENIER, 62, North Street.

Rochdale.

E—J. W. BAMFORD, 242, Yorkshire Street.
Edwards, Elliott, Fry, Ilford, Mawson, Paget, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.
F—MALLIN, 171, Yorkshire Street.
F—J. J. THOMAS & SON, 93, Yorkshire Street.
F—T. PINDER, 244, Yorkshire Street.

Rochester.

F—J. S. HEWITT, 97, Eastgate.
F—C. WYATT, 206, High Street.
F—BARNABY & COWAN, Star Hill.

Romford (Essex).

—J. W. LASHAM, chemist.
Ilford plates. Papers. Requisites. Chemicals.

Roscrea.

F—W. H. BOURKE, chemist, Castle Street.
Ilford and Paget plates. Papers. Requisites. Chemicals.

Ross.

F—CHARLES HALL, photo and music depôt, Gloucester Road.
Fry, Ilford, and Thomas plates. Papers. Requisites. Chemicals. Apparatus.

F—J. STAFFORD, High Street.
Edwards, Fry, and Ilford plates. Papers. Requisites. Chemicals.

Rotherham.

F—J. LEADBEATER, 5, Frederick Street.
Barnet, Ilford, and Thomas plates. Papers. Requisites. Chemicals.

Royston (Cambs).

F—F. R. HINKINS, Kneesworth Road.
Ilford and other plates. Papers. Chemicals.

Rugby.

F—R. TAYLOR, 20, Sheep Street.

Ryde (I. of W.)

F—TENISON SMITH, Union Street.
Barnet, Edwards, Fry and Ilford plates. Papers. Requisites.

Saffron Walden.

F—W. HOBBS, Gold Street.

Salford.

J—T. MILLER, 141, Broughton Road.

Saltburn-by-Sea.

E—J. J. HALLAM, 11, Amber Street.
Barnet, Ilford, Mawson and Thomas plates. Papers. Requisites. Chemicals.

Salisbury.

H—ATKINS & SONS, Market Place.

Sandgate.

F—W. H. JACOB, 3, High Street.
Barnet, Edwards, Fry and Ilford plates. Papers. Requisites. Chemicals.

Sandown (I. of W.)

F—J. DORE, 27, High Street.
Edwards, Fry and Ilford plates. Papers. Oddments.

Scarborough.

F—W. PARKER, chemist, 96, Westborough, and 29, Ramshill Road.
Edwards, Fry, Paget, Ilford, Mawson and Thomas plates. Papers. Requisites. Chemicals.

F—J. WHITFIELD, 113, Westborough.

Sedbergh.

F—C. E. TAYLOR, chemist, Main Street.
Ilford plates. Papers. Ordinary requisites. Chemicals.

Selkirk.

F—J. LEWIS, stationer.

Settle.

F—E. HANDLEY, Duke Street.
F—A. HORNER, Market Place.
G—J. FOWLER.
G—LATHAM & SON.

Sheffield.

E—J. CHRISTIE, 129, West Street.
Barnet, Castle, and Ilford plates. Papers. General requisites. Usual chemicals.
E—HIBBERT BROS., 117, Norfolk Street.
General stock of plates. Papers. Requisites and chemicals.
E—J. PRESTON, 4, High Street.
E—SHEFFIELD PHOTO Co., Fargate.
F—J. GARDNER, 485, Glossop Road, Broomhill.
F—TAYLOR BROS., Sheffield Moor.
F—W. FIELD, 4, High Street.

Shrewsbury.

F—ADNITT & NAUNTON, 9, The Square.
Thomas and Ilford plates. Papers. Requisites. Chemicals. Apparatus.
F—HICKIN & PYEFINCH, Mardol Head.
Ilford and Perfect (own make) plates. Papers. Requisites. Chemicals. Some apparatus.
F—SALOP STATIONERY STORES, 7, The Square.
G—LEACH, 4, Claremont Street.
G—ROBINSON, High Street.
G—WILLIAMS & CO., 29, Princess Street.

Sidcup.

G—A. W. DEWEY.

Silloth.

G—H. J. SMITH, 4, Esk Street.
Ilford plates and all usual chemicals.
F—J. BLENKINSOP, Esk Street.
Barnet, Fry, Edwards, Ilford, and Paget plates. Papers. Requisites. Chemicals. Apparatus (special makes).

Skibbereen.

H—M. WALDRON, North Street.

Sleaford.

F—W. SPYVEE, chemist, 30, Southgate.
Plates. Chemicals. Sundries and apparatus.

Smethwick.

H—H. E. WILLIAMS, chemist.
F—BETTS, chemist.

Solihull.

F—E. TRINDER, High Street.

Southampton.

F—F. SHALDERS, 17, High Street.
F—W. MARTIN, 112, High Street.
Ilford, Paget, Mawson and Wratten plates. Papers. Requisites. Chemicals. Good stock apparatus.
F—W. BATES & Co., 50, Oxford Street.
Ilford, Mawson, Marion and Wratten plates. Papers. Requisites. Chemicals. Apparatus.
F—J. M. HUMBY, 40, East Street.
G—J. PELL, Victoria Road.
G—J. WINSHIP, 40, East Street.

Southend.

H—G. R. DAWSON, 42, High Street.

Southport.

F—J. R. CAVE, chemist, 52, Nevill Street.
Castle, Ilford, Thomas, Mawson, and Wratten plates. Papers. Requisites. All chemicals. Good selection of apparatus.
F—A. FRANKS, 137, Lord Street.
Edwards, Ilford, Mawson, Thomas, Verel, and Wratten plates. Papers. Requisites. Chemicals. Apparatus.
F—C. HEATH, London Street.
F—J. B. FOGGITT, chemist.
G—BINGHAM, BAIRD & Co., 195, Lord Street.
G—WYLES & Co, 179, Lord Street.

Southsea.

E—G. KNIGHT, the Photographic Stores, 29, Middle Street.
F—J. R. PENNING, Norfolk Street.
F—RASTRICK & SONS, King's Road.
F—W. H. COOKE, 2, Sandport Terrace.
G—C. R. WRIGHT, Albert Road.

Southwell.

G—A. J. LOUGHTON, ironmonger, Market Place.
Small stock of Edwards, Ilford, and Thomas plates. Papers. Few requisites. Small stock of chemicals.

Southwold.

F—W. J. HARMER, chemist.

Spalding.

F—E. W. BELL, High Bridge.
Ilford and Thomas plates. Papers. Requisites. General Apparatus.
F—SHADFORD & Co., 21, Market Place.

Spilsby.

G—J. J. RAINEY, Church Street.
Ilford plates.

St. Albans.

G—BARRARD, Silvio House Studio.

St. Andrews.

F—SMITH & GOVAN, chemists, 109, South Street.
Ilford and Paget plates. Chemicals.

St. Austell.

F—WATSON, 3, Victoria Parade.
H—B. JULYAN, 6, Church Street.
F—W. ORCHARD, 8, High Cross Street.

St. Bees (Cumberland).

F—R. W. BROOMFIELD, chemist and photographer, Main Street.
Ilford, Mawson and Wratten plates. Papers. Requisites. Chemicals.

St. Colomb.

H—A. E. JULIAN, stationer.

St. Germans.

F—W. INGLES ROGERS.

St. Helen's.

F—J. COTTON, 65, Church Street.

St. Leonard's.

F—F. ROSSITER, HEMPSTED & Co., 14, Grand Parade.
Barnet and Ilford plates. Papers. Requisites. Chemicals. Apparatus.
F—H. A. JENNER, 28, Grand Parade.
F—J. FEAVER, 71, Bohemia Road.
F—H. J. GODBOLD, 8, Grand Parade.

St. Ronan's.

F—W. EASTON, Drug Stores.

Stalybridge.

F—DAVID INNES, chemist, 47, Melbourne Street.
Ilford, Elliott, Castle and Edwards' plates. All chemicals.

Stamford.

F—F. DICKINSON, chemist, 13, St. Mary's Street.
Fry, Ilford, Paget and Thomas plates. Papers. Requisites. Chemicals.
F—COLMAN FIELDS, chemist and dentist, 66, Scotgate.
Ilford plates. Papers. Requisites. Chemicals. Apparatus.
F—G. A. NICHOLS, photographer, 30, St. Peter's Street.
Edwards, Elliott, Fry, and Ilford plates. Papers. Requisites. Chemicals. New and second-hand apparatus.

Stirling.

H—T. WALKER.

Stockport.

F—B. N. COOPER, 54, Chestergate.
Barnet, Edwards, Ilford, and Thomas plates. Papers. Requisites. Chemicals.
F—J. ARNFIELD, 7, Lower Hillgate.
F—MORLEY & Co., St. Peter's Gate.
G—J. E. TAYLOR, 14, St. Peter's Gate.

Stockton-on-Tees.

F—F. A. GRAHAM, 14, Mill Lane.
Barnet, Thomas, and Ilford plates. Papers. Requisites. Chemicals. Apparatus.
F—BRAYSHAW & SONS, chemists.
F—T. A. ROUCHETTI, chemist.
F—W. CLARKE, 153, High Street.

Stoke-on-Trent.

F—J. H. ADAMS & Co., chemists, High Street.
Barnet, Fry, Ilford, Paget, and Thomas plates. Papers. Requisites. Chemicals.

Stony Stratford.

G—J. B. GRAVES & Co., High Street.
Ilford plates. Papers.

Stourbridge.

F—F. W. BIGGS, chemists, 151, High Street.
Ilford plates. Papers. Requisites. Chemicals. Apparatus (special makes).
F—COOKE, Limited, chemists, 154, High Street.
Ilford, Mawson and Waterloo plates. Papers. Requisites. Chemicals. Apparatus (special makes).

Stowmarket.

F—SIMPSON & Co., Market Place.

Stratford-on-Avon.

F—R. HAWKES, 33, High Street.

Stretford.

F—J. BROADBENT, chemist.

Stroud.

F—S. J. COLEY, chemist.
Ilford and Wratten plates. Papers. Requisites. Chemicals. Apparatus (Lancaster's).
F—W. H. RICKETTS, Slad Street.
Ilford plates. Papers. Requisites. Chemicals. Apparatus, chiefly ½-plate size.
G—J. H. JONES, Russell Street.

Sunderland.

F—J. WALTON & SON, 298, High Street.
Edwards, Ilford, Mawson, Thomas, Verel, and Wratten plates.
Papers. Requisites. Chemicals. Apparatus.
F—WILKINSON & Co., 15, Holmside.
F—H. A. BROWN, 3, Holmside.
F—NICOLSON & Co., 5, Fawcett Street.

Surbiton.

F—C. LOWE, chemist.

Swansea.

E—H. H. PARLBY, 9, Cradock Street (near Albert Hall).
All principal makes of plates, and all sundries.
H—N. M. GROSE, 5, Castle Street.

Swindon.

F—J. GREEN & Co., chemists.
Ilford, Fry and Thomas plates Papers. Requisites. Chemicals.

Tarporley.

F—WATSON, The Terrace.

Taunton.

F—J. CHAFFIN & SONS,65, East Street.
Barnet and Ilford plates. Papers. Requisites. Chemicals.
F—GREGORY & WREN, chemists.

Tavistock.

F—H. T. DOBLE & SON, chemists.
Various makes of plates. Papers. Requisites. Chemicals. Apparatus.

Teignmouth.

G—VALENTINE & SONS, 9, Somerset Place.
Ilford and Paget plates. Papers. Requisites. Chemicals.

Tenbury.

F—J. SLADE.
Several makes of plates, papers, &c.

Tewkesbury.

F—FULCHER, chemist.

Thame.

F—T. TAME, chemist, 19, Corn Market.
Anything required.
F—H. MORRIS, High Street.

Thirsk.

F—CLARKE & Co., Ingramgate.

Todmorden.

F—H. B. PARE, 6, Water Street.

Tonbridge.

F—S. F. WARDLEY, 132, High Street.
Ilford, Thomas and Paget plates. Papers. Requisites. Chemicals.

Torquay.

F—HORTON & Co., chemists.
General stock.
F—W. BATHE, 24, Fleet Street.
All leading makes of plates, and full stock of apparatus, materials and sundries.
G—COX & DURRANT, 8, Victoria Parade.
Ilford plates and all usual chemicals.
F—E. A. HOLLOWAY, 34, Fleet Street.
All plates and usual chemicals.
G—J. TAYLOR, Lucius Street.
F—PALK & SMITH, 8, The Strand.
F—J. TOZER, 70, Fleet Street.

Truro.

G—PERCY & ANSTEY, chemists.
Ilford plates and ordinary chemicals.

Tunbridge Wells.

F—B. WHITROW, 15, St. John's Road.
F—R. HOWARD & SON, Calverley.
F—DUNKLEY & ROGERS, High Street.
G—J. MANN, 71, Camden Road.

Twickenham.

F—H. F. READE, The Green.
G—NELSON & SON, Station Road.

Tynemouth.

F—T. O. MAWSON, 12, Percy Park Road.
Edwards, Ilford, Mawson, and Thomas plates. Papers. Requisites. Chemicals.

Uckfield.

F—E. H. FARR, High Street.
Castle, Edwards, and Ilford plates. Papers. Requisites. Chemicals. Apparatus.

Ulverston.

F—H. S. HOGG, Queen Street.
Ilford, Mawson, Thomas, and other plates. Papers. Requisites. All chemicals. Some apparatus.

Uppingham.

G—W. J. STOCKS, photographer, High Street.
Thomas and few Ilford plates. Papers. Requisites. Chemicals.

Usk.

G—H. DUNNING, Bridge Street.
Ilford and Thomas plates. Small general stock of papers and apparatus.

Uttoxeter.

G—A. PARKER, chemist, High Street.
Ilford, Thomas and Paget plates.

Ventnor.

F—C. A. SMITH, High Street.

Wakefield.

F—CHAPLIN & SON, 60, Westgate.
Ilford, Thomas and Paget plates. Papers. Requisites. Chemicals. Apparatus (sets).
F—G. & J. HALL, 9, Westgate.

Walker-on-Tyne.

G—J. BROWN, wholesale druggist.

Walsall.

F—THE WALSALL ELECTRICAL Co., 57, Upper Bridge Street.
Edwards, Fry, Ilford and Paget plates. Papers. All small requisites. Chemicals. Apparatus.

Walthamstow.

F—E. H. HAMILTON, The Parade.

Ware.

F—W. C. ADAMS, High Street.

Warrington.

F—HILL & Co., 62, Buttermarket Street.
All principal makes of plates. Papers. General requisites. Chemicals. Some apparatus.
F—M. ECKERSLEY, 33, Bridge Street.
F—J. PARKINSON, 45, Sankey Street.
H—W. P and W. SKELTON, Jubilee Buildings.

Waterford.

G—J. CAREW, 46, St. John's Hill.
Ilford plates. Papers. Chemicals.
F—H. BELL, The Quay.
G—A. H. POOLE & Co., 35, Mall.

Watford.

G—WILLIAM COLES, 60, Queen's Road.
Ilford and Thomas plates. Chemicals and developing solutions.
F—JAMES LEES, 217, High Street.
Plates, papers, chemicals, and general oddments.
G—E. MARTINDALE, 256, High Street.

Wellingborough.

F—F. SIMCO, 23, Market Street.

Wellington.

—W. GREGORY, chemist.
G—BATES, chemist.

West Malling.

F—H. C. OLIVER, chemist, High Street.
Ilford plates. Papers. Some requisites. All chemicals.

Weston-super-Mare.

F—A. PUMPHREY, chemist, 5, Bristol Road.
Ilford, Paget and Thomas plates. Papers. Requisities. Chemicals. Apparatus (special makes).

F—H. C. PARKES, chemist, 34, Upper Church Road.
Full stock Ilford and Paget, few Fry, Mawson and Thomas plates. Papers. Requisites. Chemicals. Apparatus (Lancaster's).

Weymouth.

F—WHEELER & Co.

F—TARGETT, chemist.

F—SMITH'S SUPPLY STORES, 35, St Thomas's Street.
Edwards, Castle, Fry, Ilford and Thomas plates. Papers. Requisites. Chemicals. Apparatus lent on hire.

Whitby.

F—J. BROOKS, 15, Flowergate.
Ilford and Thomas plates. Papers. Requisites. Chemicals.

F—J. FRANK, Bridge Street.
Ilford and Paget plates. Papers. Requisites. Chemicals.

F—F. H. BOWES, Skinner Street.

Whitehaven.

G—WILSON & KITCHIN, 27, King Street.
Ilford plates and all chemicals.

F—G. C. GASS, chemist, 12, King Street.
Ilford plates. Papers. Requisites. Chemicals. Apparatus.

F—F. T. PATMAN, chemist, 12, King Street.
Elliott, Ilford, and Mawson plates. Papers. Requisites. Chemicals. Good variety of apparatus.

Widnes.

G—J. W. TOWERS, Victoria Road.

Wigan.

F—J. HATHERTON, 9, Market Street.
Ilford, Mawson and Thomas plates. Papers. Requisites. Chemicals.

F—W. ASPINALL, Market Place.
Ilford and Mawson plates. Papers. Requisites. Chemicals. Apparatus.

Wimbledon.

F—H. MITCHELL, The Merton Pharmacy, High Street.
Thomas, Paget and Ilford plates up to 10 × 8. Papers. Requisites. Chemicals.

Wincanton.

F—W. HARRIS, North Street.

Winchester.

F—GIBB, 31, High Street.
Ilford, Marion and other plates. Papers. Requisites. Chemicals.

Windsor.

H—A. MERRICK.
F—J. D. HARMER, St. Leonard's Road.

Wisbech.

G—J. KENNERELL, 8, High Street.
Paget, Ilford and Lancaster plates. Papers. Requisites. Chemicals.
F—W. T. OLDHAM & SON, chemists and opticians, 10, Market Place.
Various makes of plates up to $8\frac{1}{2} \times 6\frac{1}{2}$. Papers. Requisites. Chemicals. Apparatus. Complete outfits.

Witham.

H—R. P. GREEN, chemist.

Wolverhampton.

G—A. E. BEARDMORE, chemist, 365, New Hampton Road.
Ilford and Thomas's plates. Various sundries.
G—F. J. GIBSON, 93, Darlington Street.
F—READ BROS. & Co., chemists.
F—T. M. LAWS, 41, Darlington Street.
All principal makes of plates. Papers. Requisites. Chemicals. Apparatus.

Woodbridge.

G—THOS. BLANDEN, Castle Street.
Ilford plates up to half-plate size. Developers.
F—E. J. EATON, chemist.
F—BETTS & SON, chemists.

Woodford.

F—R. BROOME, Woodford Green.

Woolwich.

F—BROMWICH & Co., 69, New Road.

Worcester.

F—C. FERNELEY, 61, Tything.
Barnet, Ilford, and Britannia plates. Papers. Requisites. Chemicals. Apparatus.
F—J. A. STEWARD, 27, High Street.
F—LLOYD THOMAS, 56, Sidbury.
G—H. WATKINS, College Gates.

Worksop.

F—T. MARRIS, 83, Bridge Street.
Edwards, Marion, and Ilford plates. Papers. Requisites. Chemicals. Apparatus.

Worthing.

F—A. B. CORTIS, 30, South Street.
Fry, Ilford, Thomas, and Paget plates. Papers. Requisites. Chemicals. Apparatus.

Wotton-under-Edge.

G—A. DURN, 30, Church Street.
Ilford goods. Apparatus.

Yarmouth.

G—EAST NORFOLK PHOTOGRAPHIC Co., 29, Regent Street.
Elliott, Fry, and Ilford plates. Various sundries.
G—E. MILLER, 14, King Street.
G—J. G. GODDARD, Nelson Road.
F—OWLES & SON, The Quay.
F—J. J. BURNLEY, Nelson Road.
G—SHERMAN, Regent's Road.
G—G. ISAAC, Regent Street.

Yarmouth (I. of W.)

F—J. E. RICHARDSON, High Street.
Ilford and Marion plates. Good supply chemicals and oddments.

York.

F—A. YARDLEY, 99, Nunnery Lane.
E—M. MIDGLEY, 51, Fossgate.
Wratten, Edwards, Ilford, Barnet, Paget, Marion, Thomas, and Mawson plates. Papers. Requisites. Chemicals.
F—J. M. SMITH, 13, High Ousegate.

Youghal.

F—THOMAS & Co.



DARK ROOMS.

THE list published last year met with so much approbation at the hands of readers that we felt encouraged to strive for extension and amplification in the present one. To that end, attached to the circular (referred to in introduction to list of dealers) was a request for information about dark rooms, and from even the limited number of replies received we are able to give what, we venture to think, will prove a very useful list. The information given is principally divided into the following:—

Information.—Whether for changing only, or developing, as well as any notes of interest.

Terms for Use.—This is somewhat difficult, but the charges are at all times but very trifling. "Free to customers" means no charge to purchasers of plates or materials. In many cases where a definite charge is stated, this would still be the case. On the other hand, when "free to customers," readers can safely reckon that a small payment will obtain them the desired convenience, should they not have occasion to purchase anything. The charges for developing are for *use of room*, and, of course, the visitor does the work. It generally includes dishes, measure glasses, gas, water, alum and fixing baths; but not chemicals or developing solutions. In some cases development is undertaken for the visitor at fixed charges.

Hours Open.—Those given are usually the ordinary business hours, but at many places an extension will be obtainable by arrangement beforehand.

In the cases where we have no information, it has been necessary to fall back upon the classification adopted last year. This was as follows:—

A.—Those open to all, either free, or upon payment of a small fee.

B.—Society rooms, available upon production of a society membership ticket, or an introduction from a society secretary.

C.—Hotels and apartments, which are usually free to visitors staying in the house, and open to others upon payment of a small fee.

D.—Private rooms kindly offered by amateurs for the benefit of others, requiring a letter of introduction from us, which can be obtained free if stamped envelope be sent.

We shall be at all times glad to receive corrections and additions to the list, either from readers or from those possessing accommodation. Similar information to that given in our list should, however, always be sent.

C C C

Aberdare.

A—J. L. BERRY, 43, Cardiff Street.
Information—Changing may be done by arrangement. *Terms for Use*—According to circumstances. *Hours Open*—On applying at the studio.

Aberdeen.

A—W. B. ANDERSON, 26, Union Terrace.
Information—Changing and developing. *Terms for Use*—No charge to tourists. *Hours Open*—9 a.m. to 7 p.m. during summer months.
A—JAMES HENDERSON, 13, Crown Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p.m.
A—J. & J. URQUHART, 65, St. Nicholas Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. till 8 p.m.
A—W. REID, 100, Holburn Street.

Aberystwith.

A—D. J. LEWIS, 15, Great Darkgate Street.

Alcester.

A—J. D. ADCOCK & SONS, chemists.

Alloa.

A—NORVAL, 36, Primrose Street.

Alston.

A—T. BRAMWELL, photographer.

Alton (Hants.)

A—G. FROST, Market Street.
Information—Changing and developing. *Terms for Use*—Depends upon time, etc., but a trifle. *Hours Open*—During business hours.

Ambleside.

C—THE QUEEN'S HOTEL.

Arbroath.

A—S. MILNE, St. Ruth's.

Ashton-under-Lyne.

A—S. SHARP, 241, Stamford Street.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—9 a.m. till 9 p.m.
B—THE LOCAL SOCIETY'S ROOM, Henry Square.
Introduction needed from the secretary.

Aylesbury.

A—A. G. WRIGHT, 16, Market Square.
Information—Changing and developing. *Terms for Use*—Free to purchasers. *Hours Open*—8 a.m. to 8 p.m.
A—JOHN WOOD, 35, High Street.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—8 a.m. to 6 p.m.

Bainbridge, near Bedale.

A—A. KNAGGS.
Information—Changing and developing. *Terms for Use*—Not fixed. *Hours Open*—8 a.m. to 8 p.m.

Ballymena.

A—T. ERWIN, 76, Church Street.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—9 a.m. to 7 p.m.

Barmouth.

A—H. M. APPLEYARD, photographer.

Barnet.

A—E. A. MAXWELL, 50, High Street.
Information—Changing and developing. *Terms for Use*—Changing 3d., developing (without solutions) 6d. per hour. *Hours Open*—8.30 a.m. to 7.30 p.m.

Barnstaple.

A—J. J. TREMEER, 65, Boutport Street.
Information—Changing and developing. *Terms for Use*—Free to buyers. *Hours Open*—10 a.m. to 5 p.m.

Barrow.

A—S. TAYLOR, Dalton Road.
A—DAVIS & SONS, Abbey Road.
C—THE IMPERIAL HOTEL.

Bath.

A—A. W. YABSLEY, 9, Old Bond Street.
Information—Changing and developing. *Terms for Use*—Changing free, developing 1s. per day, including dishes. *Hours Open*—9 a.m. to 7 p.m.
A—H. J. WALKER & Co., 8, Broad Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 9 p.m.
A—W. M. ASHMAN, 12A, Old Bond Street.
Information—Changing and developing. *Terms for Use*—Changing free, developing by arrangement. *Hours Open*—By appointment between 9.30 a.m. and 7 p.m.
A—W. G. HONEY, 15, Orange Grove.

Bedford.

A—ANTHONY & BISS, chemists.
Information—Changing and developing. *Terms for Use*—Changing free, developing half-hour 4d., hour 6d. *Hours Open*—All day.

Beith, N.B.

A—J. WYLIE, 27, Eglington Street.

Belfast.

A—RODMAN & Co., 41, Donegall Place.

Belper.

A—J. F. HAYNES, High Pavement.

Information—Arrangements made for use of a photographer's dark room.

Bettws-y-Coed.

A—R. PARRY, chemist.

Information - Changing and developing. *Terms for Use*—Changing 4d., developing 6d. *Hours Open*—8 a.m. to 8 p.m.

Beverley.

A—T. J. MORLEY & Co., Lair Gate.

Information—Changing and developing. *Terms for Use*—Changing 3d., developing 6d. *Hours Open*—9 am. to 9 p m.

Bideford.

A—TARDREW & SONS, 9, High Street.

Information—Changing and developing. Electric light. *Terms for Use*—Changing free, developing 1s. per hour. *Hours Open*—9 a.m. to 4 p.m.

A—W. H. GOAMAN, Mill Street.

Birkenhead.

A—CRAGG JAMES, 80, Argyle Street.

Information—Changing only. *Terms for Use*—Nominal. *Hours Open*—9 a.m. to 6 p.m.

A—R. C. HUGHES, 2, Temple Road.

Birmingham.

A—J. THORPE, 29, Congreve Street.

Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—7 a.m. to 9 p.m.

A—C. F. JARVIS, Villa Road, Handsworth.

Information—Changing and developing. *Terms for Use*—Free, chemicals only charged for. *Hours Open*—9 a.m. to 6 p.m.

A—GEO. RILEY, 205, Soho Road, Handsworth.

Information—Changing only. *Terms for Use*—Free. *Hours Open*—7 a.m. to 8 p.m.

A—J. DAVIS, 39, Summer Lane.

Information—Changing and developing. *Terms for Use*—6d. per hour. *Hours Open*—8 a.m. to 9.30 p.m.

A—E. ALSTON, 243, Ladypool Road, Sparkbrook.

Information—Changing and developing. *Terms for Use*—Moderate. *Hours Open*—9 a.m. to dusk.

A—S. HULME, New Street.

A—MORRIS, BANKS & Co., Bull Ring.

A—SOUTHALL BROS. & BARCLAY, Bull Street.

A—P. HARRIS & Co., Edmund Street.

A—W. TYLAR, 57, High Street, Aston.

A—R. H. BLEASDALE, 104, Dale End.

A—R. ROLAND WHITE, 175, Moseley Road.

A—T. LEWIS, 135, Stratford Road.

A—WALTER GRIFFITHS, Ltd., Union Passage, New Street.
B—MIDLAND CAMERA CLUB, Queen's College, Paradise Street.
Upon applying to the Hon. Sec., Walter D. Welford, 47, Hagley Road, Edgbaston.

Bishop Auckland.

A—T. DOBINSON, 125, Newgate Street.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—8 a.m. to 7 p.m.
A—H. THORBURN & SON, 3, Newgate Street.

Bishop Stortford.

A—JOHN HARDY, North Street.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—8 a.m. to 7 p.m.

Blackburn.

A—H. GRAYSON, 11, New Market Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—All hours.
A—A. P. GARLAND, 80, King William Street.
A—N. McNEILL, 40, Preston New Road.

Blackpool.

A—J. JACKSON, 61, Talbot Road.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—All day.
A—A. P. GARLAND, 24, Foxhall Road.

Bolton.

A—T. H. HEYES, 150, Deansgate.
Information—Changing and developing. *Terms for Use*—No charge to customers. *Hours Open*—8 a.m. to 9 p.m.
A—W. BANKS, 32, Corporation Street.
Information—Changing and developing. *Terms for Use*—6d. an hour. *Hours Open*—10 a.m. to 8 p.m.

Bourne (Lincs).

A—W. H. REDSHAW.
Information—Changing only. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 7 p.m.

Bournemouth.

A—C. DALES, Greenwich House.
Information—Changing and developing. *Terms for Use*—No charge except for chemicals. *Hours Open*—8 a.m. to 8 p.m.
A—W. F. FOSTER, Clyde House, Hamilton Road.
Information—Changing and developing. *Terms for Use*—6d. an hour, or by arrangement. *Hours Open*—Any time during the day.
A—S. HARDWICK, 21, Commercial Road.
A—W. JONES, 203, Old Christchurch Road.
C—ST. ELMO BOARDING HOUSE, Old Christchurch Road.

Bradford.

A—J. WALKER, 22, Charles Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8.30 a.m. to 7.30 p.m.
A—HARRISON, PARKINSON & Co., chemists.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 7.30 p.m.
A—W. T. TOWNSEND, 1, Heidelburg Road.
Information—Changing only. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 8 p.m.
A—RILEY BROS., 5, Cheapside.
A—C. H. EDHOUSE & Co., 89, Whelley Lane.

Bramley (near Leeds).

A—W. S. BAXTER, chemist.
Information—Changing and developing. *Terms for Use*—Changing free, developing usual terms. *Hours Open*—8 a.m. to 9 p.m.

Brechin, N.B.

A—GEO. MACKIE, 51, High Street.
Information—Photo Society's room, opened to strangers introduced by members. *Terms for Use*—1s. per month. *Hours Open*—All hours.

Bridlington.

A—B. ALLANSON, Esplanade.

Brighouse.

A—W. DAWSON, Huddersfield Road.
Information—Changing and developing. *Terms for Use*—Changing 3d., developing, 6d. *Hours Open*—9 a.m. to 7 p.m.

Brighton.

A—J. WILLIAMSON, 144, Church Road, Hove.
Information—Changing and developing. *Terms for Use*—Changing 6d. or 1s. per day. Developing 1s. per hour, including solutions. *Hours Open*—9 a.m. to 9 p.m.
A—HARDCASTLE & Co., 71, East Street.
G—ROYAL YORK HOTEL, Old Steyn.
A—A. D. NORMAN & Co., 9, North Street, Quadrant.

Bristol.

A—M. W. DUNSCOMBE, 10, St. Augustine's Parade.
Information—Changing and developing. *Terms for Use*—Changing free, developing according to requirements. *Hours Open*—9 a.m. to 7 p.m.
A—H. HUSBANDS, 8, St. Augustine's Parade.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—9 a.m. to 7 p.m.
A—THE BRISTOL PHOTO STORES, W. T. Whetter, 14, Lower Arcade.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 7.30 p.m.
A—F. T. LAMBERT, Blackboy House, Redland.

Bromley (Kent).

A—SHILLCOCK & SON, 122, High Street.
Information—Changing and developing. *Terms for Use*—No charge to customers. *Hours Open*—8 a.m. to 8 p.m.

Burnley.

A—J. WRIGHT, 141, St. James Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—Not stated.

Burton-on-Trent.

A—B. COWGILL, 58, Manchester Road.

Burslem.

A—T. BLACKSHAW, 35, Market Place.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—8 a.m. to 8 p.m.

Burnham (Somerset).

A—E. W. GOUGH, Medical Hall.
Information—Changing and developing.
A—J. S. SIMNET, 76, Guild Street.

Bushey New Town.

A—R. H. GANT, 32, Villiers Road.
Information—Changing and developing. *Terms for Use*—Changing free to all, developing free to customers. *Hours Open*—8 a.m. to 8 p.m.

Callander, N.B.

A—J. FINNIE, The Studio.
Information—Changing only. *Terms for Use*—Sixpence. *Hours Open*—9 a.m. to 6 p.m.

Cambridge.

A—E. FIELD, Hills Road.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—8 a.m. to 6 p.m.
A—BEALL & SONS, 25, Sidney Street.
Information—Changing only. *Terms for Use*—Not stated. *Hours Open*—8 a.m. to 8 p.m.
A—E. SANDERSON, 48, Bridge Street.
A—G. MAYNARD, Victoria Road.

Canterbury.

A—W. POLLARD, 58, St. George's Street.
Information—Changing and developing. *Terms for Use*—Small charge. *Hours Open*—9 a.m. to 8 p.m. (Thursdays 5 p.m.)
A—W. H. FIDDIAN, 62, King's Bridge.
Information—Changing and developing. *Terms for Use*—Changing 3d., developing 1s.. *Hours Open*—9 a.m. to 9 p.m.
A—J. CRAIK, 4, St. George's Street.

Cardiff.

A—J. R. WOOD, 4, Castle Arcade.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 8 p.m. (Wednesdays 2 p.m.)
B—G. H. BEDFORD, 127, Bute Road.
A—WILLIAMS & Co., Park Hall Buildings.

Carshalton (Surrey).

A—F. CARTER, High Street.

Chelmsford.

A—F. H. DENNIS, 20, High Street.
Information—Changing only. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 7 p.m.

Cheltenham.

A—GREENWAY BROS., 339, High Street.
Information—Changing and developing. *Terms for Use*—6d. per hour. *Hours Open*—9 a.m. to dusk.
A—THOMAS BROS., College Pharmacy.
A—R. L. PARSONS, Rodney Terrace.

Chepstow.

A—E. BALLARD, 10a, Welsh Street.
Information—Changing only. *Terms for Use*—Sixpence. *Hours Open*—Any time.

Chester.

A—G. KEMP, 59, Bridge Street.
Information—Changing and developing. *Terms for Use*—Changing free; developing, 1s., or by arrangement. *Hours Open*—8 a.m. to 8 p.m.
A—J. H. SPENCER, 36, Bridge Street.
Information—Changing and developing. *Terms for Use*—Changing free, developing, charge for materials, and small charge for dishes. *Hours Open*—8 a.m. to 8 p.m.

Chesterfield.

A—SAMPSON & BARFOOT, 7, Market Place.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—9 a.m. to 9 p.m.
A—GEO. WRIGHT, Cavendish Street.
Information—Changing only. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 8 p.m.

Chichester.

A—E. A. LONG, 15, East Street.
Information—Changing and developing. *Terms for Use*—No charge to customers, except for materials. *Hours Open*—8 a.m. to 8 p.m.
A—A. G. EVERARD, chemist, 9, North Street.
Information—Changing and developing. *Terms for Use*—Nominal. *Hours Open*—10.30 a.m. to 4 p.m., or special arrangements.

Chippenham.

A—J. R. SINGER, Somerset Cheese Stores.

Chorley.

A—H. R. DORNING, 8, Pall Mall.
Information—Changing and developing. *Terms for Use*—Small fee, or free to customers. *Hours Open*—8 30 a.m. to 8 p.m.
A—T. L. & W. ALKER, 70, Market Street.
Information—Changing and developing. *Terms for Use*—No charge. *Hours Open*—Any hour of day.

Christchurch.

A—A. MALLETT, High Street.
Information—Changing and developing. *Terms for Use*—Sixpence. *Hours Open*—8 a.m. to 8 p.m.

Cirencester.

A—W. GRIFFITHS.

Clacton-on-Sea.

A—W. MANN, 2, Pier Avenue.
Information—Changing and developing. *Terms for Use*—Changing 3d., Developing, 1s. *Hours Open*—8 a.m. to 8 p.m.

Cleckheaton.

A—H. W. KNOWLES.

Clevedon.

A—T. BAKER, The Baths.

Clifton.

A—F. T. J. MORRIS, 137, Whiteladies Road.
A—F. HOLMES, 81, Whiteladies Road.

Colchester.

A—J. C. SHENSTONE, 13, High Street.
Information—Changing and developing. *Terms for Use*—Changing free, developing 6d. or 1s. (according to time). *Hours Open*—8 a.m. to 8 p.m. (Thursdays, 2 p.m.)

Colne (Lancs.)

A—J. DUCKWORTH, Cloth Hall.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—7 a.m. to 7 p.m. (Saturdays, 12.30 noon.)

Colwyn Bay.

A—C. R. CHAPLIN, Park Road.

Cork.

A—BAKER & WRIGHT, 48, Patrick Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 5 p.m.

Coalville.

A—F. BRUNT.

Coventry.

A—HENRY GLOVER, 68, Spon Street.
Information—Changing and developing. *Terms for Use*—Changing free, nominal change for developing. *Hours Open*—9 a.m to 6 p.m.
A—J. JACKSON, Trafalgar Street.

Crewe.

A—E. BOOTH, Chester Bridge

Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 8 p.m.

Cromer.

A—T. MACK, Church Street.

Information—Room specially devoted to changing and developing. *Terms for Use*—Changing, 6*d.*; developing, 1s. *Hours Open*—9 a.m. to 6 p.m.

Dalton-in-Furness.

H—H. ARMISTEAD, Market Street.

Darlington.

A—F. W. COOPER, Ivy House, Bondgate.

Information—Changing and developing. *Terms for Use*—Free to customers, slight charge to others. *Hours Open*—8.30 a.m. to 7 p.m.

A—J. ROBINSON, Northgate.

Information—Changing only. *Terms for Use*—Free. *Hours Open*—10 a.m. to 4 p m.

Dartmouth.

A—N. HICKS, New Road.

Dawlish.

A—CHAPMAN & SONS

Derby.

A—RICHARD KEENE, Iron Gate.

Information—Changing and developing *Terms for Use*—Gratis. *Hours Open*—10 a.m. to 7 p.m.

Devizes.

A—EDWARD HILL, 25, The Brittox.

Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 8 p.m.

Devonport.

A—H. W. GILL, 33, Catherine Street.

Dewsbury.

A—J. DINSDALE, 34, Green Lane, Westbury.

Doncaster.

A—J. W. LEE, 45, East Laith Gate.

Dorchester.

A—A. H. EVANS, chemist.

Information—Changing only. *Terms for Use*—No charge if plates obtained. *Hours Open*—8 a.m. to 6 p.m.

Douglas (Isle of Man).

A—BREARY & SON, Prospect Hill.
Information—Changing and developing. *Terms for Use*—Changing, free to customers; developing, small charge according to time. *Hours Open*—8 a.m. to 9 p.m.
A—R. HARTFORD, 52, Athol Street (apartments).
C—HARRISON'S BOARDING HOUSE, Walpole Avenue.

Dover.

A—J. G. WHORWELL, 7, Bench Street.
Information—Changing and developing. *Terms for Use*—Changing, 3d., or 2s. 6d. per week. *Hours Open*—8 a.m. to 6 p.m., or by arrangement.
A—M. JACOLETTE, Northbrooke House.

Downham Market.

A—R. J. JOHNSON, High Street.

Drogheda.

A—LUKE, J., Healy, 82, West Street.
Information—Changing and developing. *Terms for Use*—Changing, 3d.; developing, 6d. per half-hour. *Hours Open*—11 a.m. to 6 p.m.

Dublin.

A—J. ROBINSON & SONS, 65, Grafton Street.

Dundee.

A—PETER FEATHERS, 6, Castle Street.
Information—Changing and developing. *Terms for Use*—Changing free; developing, 1s. *Hours Open*—9 a.m. to 7 p.m.
A—A. BIRNIE, 118, Perth Road.
A—G. SOWDEN, Reform Street.

Dunfermline.

A—NORVAL, The Studio.

Durham.

A—J. N. WISE, 14, Claypath.
Information—Changing and developing. *Terms for Use*—Free for changing, small charge for developing. *Hours Open*—9 a.m. to 7 p.m.

Ealing Dean.

A—F. SANQUINETTE, chemist.

Earlestown.

A—THOS. UNSWORTH, 51, Cross Lane.

Eastbourne.

A—F. J. COX, 56, Terminus Road.
Information—Changing and developing. *Terms for Use*—Depend on circumstances. *Hours Open*—10 a.m. to 6 p.m.
A—J. B. FLATMAN, 40, Pevensey Road.
Information—Changing and developing. *Terms for Use*—Changing, 1d.; developing, including dishes, racks, hypo, etc., ¾ hour 6d., 1 hour 9d. *Hours Open*—About 6 a.m. to 10 p.m., according to time of year.

East Dereham.

A—E. PECK, chemist.
Information—Use of room by arrangement. *Terms for Use*—Not stated. *Hours Open*—10 a.m. to 6 p.m.

East Molesey.

A—O. PARROTT, Bridge Road.
Information—Changing and developing. *Terms for Use*—According to work done and chemicals used. *Hours Open*—8 a.m. to 9 p.m.

Eccles.

A—W. I. SCHOLES, 130, Church Street.
Information—Changing only. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 9 p.m.

Eckington.

A—H. ROTHERHAM, chemist.

Edinburgh.

A—W. C. CLYNE, 69, Nicolson Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 8 p m.
A—R. H. McBEAN, 25, Albert Place.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 7 p.m.
A—A. D. GUTHRIE, Bonnington.
Information—Changing and developing. *Terms for Use*—Changing free, developing according to time and chemicals used. *Hours Open*—9 a.m. to 9 p.m.
A—S. KEITH, 69, South Clerk Street.
Information—Changing only. *Terms for Use*—6d. per hour. *Hours Open*—9 a.m. to 8 p.m.
A—W. HUME, 1 Lothian Street.
A—J. M. TURNBULL, 6 Rose Street.
A—T. HADDOW, 2, Maitland Street.
A—G. CALDER, 13, Lothian Street.
A—A. H. BAIRD, 15, Lothian Street.
A—J. BUNCLE, 7, Hope Street.
A—A. A. INGLIS, Rock House, Calton Hill.

Edmonton.

A—C. COUSINS, 2, Bridge Villas, Fore Street.

Ely.

A—G. E. KNIGHT, High Street.
Information—Changing and developing. *Terms for Use*—Free to customers, a charge of 6d. for changing and by arrangement for developing to others. *Hours Open*—8 a.m. to 8 p.m.

Eton.

A—W. OLDHAM, 100, High Street.
Information—Changing and developing. *Terms for Use*—Free to purchasers. *Hours Open*—8 a.m. to 8 p.m.
A—A. MERRICK, The College.

Evesham.

A—PUMPHREY & SON, 23 and 24, Port Street.
Information. Changing and developing. *Terms for Use*—According to requirements. *Hours Open*—8 a.m. to 8 p.m.
A—S. E. DOEG, Bridge Street.

Exeter.

A—J. H. LAKE, 41, High Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—10 a.m. to 8 p.m.

Faversham.

A—J. AUSTIN, 5, West Street.
A—W. LAXON, chemist.

Felixstowe.

A—C. J. EMEMY, the Beach Studio.
Information—Changing only. *Terms for Use*—Not stated. *Hours Open*—10 a.m. to 6 p.m., when not in use.
A—C. B. TYLER, Victoria Parade.

Filey.

A—WALTER FISHER, Belleouse Street, near The Crescent.
Information—Changing and developing. *Terms for Use*—6d. per hour, or by agreement. *Hours Open*—9 a.m. to 6 p.m., or by agreement from 7 a.m. to 10 p.m.

Finchley.

A—E. SCAMELL, 4, Albert Terrace.

Fleet (Hants.)

A—J. T. HACKETT, 291, Albert Street.
Information—Changing and developing. *Terms for Use*—Changing 3d., developing 1s. per hour. *Hours Open*—10 a.m. to 10 p.m., appointment desirable.

Frome.

A—E. C. F. GREEN, top of Catherine Hill.

Galashiels.

A—J. WALKER, 50, High Street.
Information—Changing and developing. *Terms for Use*—Small charge for use of chemicals, dishes, etc. *Hours Open*—10 a.m. to 5 p.m.

Galway.

A—R. W. SIMMONS, photographer, 26, Dominick Street.
Information—Changing and developing. *Terms for Use*—Whatever is usual. *Hours Open*—9 a.m. to 7 p.m.

Glasgow.

A—J. LIZARS, 16, Glassford Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6.30 p.m.

A—J. LIZARS, 260, Sauchiehall Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6.30 p.m. (Saturdays 2 p.m.)
A—J. TROTTER, 24, Gordon Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 7 p.m. (Saturdays 2 p.m.)
A—JAMES MORE, 77, Renfield Street.
Information—Changing and developing; specially fitted room. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 6 p.m. (Saturdays 3 p.m.)
A—G. MASON & Co., 180, Sauchiehall Street.
A—McGHIE & Co., 75, St. Vincent Street.
A—BOLTON & SONS, 47, West Nile Street.
A—ALBION ALBUMENIZING Co., 96, Bath Street.
A—STEVENSON & Co , 109, Bothwell Street.

Gloucester.

B—E. G. HUGHES, 86, Northgate Street.
Information—Photographic Society's room.
A—W. WALWIN, Southgate Street.
Information—Two rooms for changing and developing. *Terms for Use*—Changing free to customers; nominal charge for developing. *Hours Open*—Day and night.
A—A. H. PITCHER, 58, Southgate Street.
Information—Changing and developing. *Terms for Use*—Changing free. *Hours Open*—9 a.m. to 6 p.m.

Goole.

A—J. T. BENTLEY, 39, Aire Street.

Gorleston.

A—J. LIFFEN, 6, Pier Cliff Terrace, Cliff Hill.
Information—Changing and developing. *Terms for Use*—Changing or developing, 3d., 1s. 6d. per week. *Hours Open*—7 a.m. to 10 p.m.
A—W. HINDLE, chemist.
D—H. H. GEORGE.

Gosport.

A—E. S. BALCHIN, 83, High Street.

Greenock.

A—J. GRAHAM, 19, Cathcart Street.

Greenwich.

A—LEO. ATKINSON & Co., 193, Greenwich Road.
Information—Changing only. *Terms for Use*—Free to customers, others 3d. *Hours Open*—8.30 a.m. to 8.30 p.m.

Grimsby.

A—J. H. BOWMAN, 89, Cleethorpes Road.
A—W. BRUMPTON, Oliver Street Studio

Guernsey.

A H. CUMBER, jun., 4, Fountain Street.
Information—Changing and developing. *Terms for Use*—Changing free, developing 6d per hour. *Hours Open*—10 a.m. to 7 p.m.
A—A. Le CHENINANT, 15, Commercial Arcade.

Guisborough.

A—R. BLAKEBOROUGH, Solgraph Co.

Halifax.

A - C. A. HIGGINS, 7, Bull Green.
Information—Changing and developing. *Terms for Use*—Changing free, developing 6d. per hour. *Hours Open*—8 a.m. to 8 p.m.

Hampton.

A—H. W. NEWTON, 13, The Avenue.

Hanley.

A –J. W. MOORE, 7, Market Square.
A—F. & G. PACKER, 48, Trinity Street.

Harrow.

A—J. A. SMITH, watchmaker.

Hastings.

A—A. BROOKER, 52a, Robertson Street.
Information—Changing and developing. *Terms for Use*—Changing free to customers, to others 6d. *Hours Open*—8 a.m. to 10 p.m. (summer), developing 1s.
A -GODBOLD & Co., 25, White Rick.

Havant.

A –W. SCORER, North Street.
Information—Changing and developing. *Terms for Use*—Changing, 6d.; developing, 1s. (including solutions). *Hours Open*—8 a.m. to 8 p.m.

Hexham.

A—HUNTER & SONS, 25, Fore Street.
Information—Changing and developing. *Terms for Use*—Usual prices. *Hours Open*—8 a.m. to 9 p.m.
A—GIBSON & SONS, chemists.

Howden (Yorks.)

A—R. J. LATHAM, Market Place.
Information—Changing, only available when owner is at home. *Terms for Use*—Not stated. *Hours Open*—8 a.m. to 8 p.m.

Huddersfield.

A—W. F. PIGGOTT, 37, King Street.
Information—Changing and developing. *Terms for Use*—Changing free, developing free to customers. *Hours Open*—All day.
A -G. , .

Hull.

A—C. P. GIBSON, 16, Whitefriargate.
Information—Changing and developing. *Terms for Use*—Nominal. *Hours Open*—9 a.m. to 7 p.m.

Ilfracombe.

A—CHARLES THORNLEY, 23, High Street.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 10 p.m.
A—E. D. PERCIVAL, Catford's Art Galleries, 5, High Street.
Information—Developing. *Terms for Use*—1s. per day, 3s. 6d. per week, free to purchasers. *Hours Open*—From 8 a.m.
A—TWISS & SONS, The Arcade.
Information—Changing and developing. *Terms for Use*—By arrangement. *Hours Open*—9 a.m. to 9 p.m.
C—ST. JAMES'S BOARDING HOUSE.

Inverness.

A—W. OGSTON, 18, Union Street.
Information—Changing. *Terms for Use*—Free to purchasers. *Hours Open*—8.30 a.m. to 9.30 p.m.
A—W. J. BETHUNE, chemist, 99, Academy Street.
Information—Changing and developing. *Terms for Use*—Changing free if plates are bought, if not 3d.; developing and minimum charge, 6d.

Ipswich.

A—WIGGIN & SON, 34, St. Matthew's.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 8 p.m.
A—W. H. MARSH, 37, Upper Brook Street.
Information—Changing and developing. *Terms for Use*—1s. per hour. *Hours Open*—9 a.m. to 8 p.m.

Jarrow-on-Tyne.

A—WILLIAMSON & Co, Ellison Street.
Information—Changing and developing. *Terms for Use*—3d. *Hours Open*—8 a.m. to 8 p.m.

Jersey.

A—F. G. DE FAYE, 21, David Place.
Information—Changing and developing. *Terms for Use*—Changing free, small charge for developing. *Hours Open*—9 a.m. to 8 p.m.
A—J. T. BAKER, 27, Halkett Place.
Information—Changing and developing. *Terms for Use*—Changing free, small charge for developing. *Hours Open*—Any time.
C—THE PRINCE OF WALES'S HOTEL.
A—P. GODFRAY, 35, Belmont Road.

Keighley.

A—A. N. KERSHAW, Corn Mill Bridge.
Information—Changing and developing. *Terms for Use*—Changing free, developing 6d. per hour. *Hours Open*—8 a.m. to 8 p.m.

Kendal.

A—G. F. RIGG, 43, Finkle Street.
Information—Changing only. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 7 p.m.
A—SEVERS & BATESON, 23, Sticklandgate.
Information—Changing and developing. *Terms for Use*—Free to purchasers of goods. *Hours Open*—9 a.m. to 7 p.m.
C—THE COMMERCIAL HOTEL.

Keswick.

A—H. McDONALD.
A—A. PETTITT, the Art Gallery.
C—THE QUEEN'S HOTEL.

Kilkee (Co. Clare).

A—C. MOORE'S HOTEL.

Kirkcaldy.

A—D. STORRAR, 228, High Street.
Information—Changing and developing. *Terms for Use*—Free to customers, small change to others. *Hours Open*—8 a.m. to 8 p.m.

Kirkintillock.

A—MRS. ARTHUR, the Studio.

Lancaster.

A—DAVIS & SONS, 23, New Street.
Information—Changing and developing. *Terms for Use*—Changing free to customers, small charge for developing according to time. *Hours Open*—8 a.m. to 7 p.m.
A—W. BRIGGS, 21, Cheapside.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 8 p.m. (Wednesdays 1 p.m.)
C—THE KING'S ARMS HOTEL.

Largs (Ayrshire).

A—W. G. STORY, Bath Street.
Information—Changing and developing *Terms for Use*—Changing, 3d.; developing, 6d. per half-hour. Weekly ticket, 3s. 6d. *Hours Open*—8 a.m to 8 p.m.

Leamington.

A—SMITH & SON, 102, Parade.
Information—Changing and developing. *Terms for Use*—Changing free; nominal charge for developing. *Hours Open*—9 a.m. to 7 p.m.
A—JUDD & Co., 40, Bath Street and 50, The Parade.
Information—Changing and developing, only at 50, The Parade. *Terms for Use*—No charge to customers. *Hours Open*—9 a.m. to 8 p.m.
A—SMARTT & SON, 54, Parade.

Leeds.

A—PEARSON & DENHAM, 5, New Station Street.
A—REYNOLDS & BRANSON, 14, Commercial Street.
A—C. C. VEVERS, 12, Market Street, Briggate.
A—R. H. WHITE, 18, Park Row.
A—H. CROSSLEY, Rodley.

Leek (Staff.)

A—JOHNSON & SONS, 5, Stanley Street.
Information—Changing. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 7 p.m.

Leicester.

A—R. BROOF, 66, Belgrave Gate.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8.30 a.m to 7.30 p m.
A—J. YOUNG, 16, Gallowtree Gate.
A—A. NEWTON, 19, Belvoir Street.

Lerwick (Shetland).

A—R. H. RAMSAY, Charlotte Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p.m.

Leytonstone.

A—J. J. FERGUSON, Cann Hall Road.
Information—Changing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 8 p.m. (Thursday, closed from 12 to 6 p.m.)
A—H. WEBBER, Kirkdale Studio.

Lincoln.

A—J. T. BIRKBECK, 5, Bailgate.
Information—Changing and developing. *Terms for Use*—According to requirements. Developing, ½ plate, 2s. 6d. doz.; ¼ plate, 1s. 6d doz.; with everything found. *Hours Open*—8 a.m. to 8 p.m.
C—THE GREAT NORTHERN HOTEL.

Liverpool.

A—WOOD BROS., 73, Lord Street.
Information—Changing and developing. *Terms for Use*—Nominal charge for developing only. *Hours Open*—9 a.m. to 7 p.m.
A—J. HAIGH, 77a, Dale Street.
Information—Changing. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 7 p.m.
A—W. H. PUGH, 2, Whitechapel.
Information—Changing and developing. *Terms for Use*—Ten minutes 6d., one hour 2s. 6d. *Hours Open*—9 a.m. to 6 p.m.
A—STREET & Co., 63, Bold Street.
Information—Changing and developing, and use of gallery if required. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p m.
A—J. J. ATKINSON, Manchester Road.
A—H. C. LEWIS & Co., 31, Bold Street.
A—CITY PHOTO Co., 243, West Derby Road.
A—SACCARINO PHOTO Co., 11a, Renshaw Street.
A—WALMSLEY & Co., 2, Shaw Street.
A—R. BROWN, 35, Bold Street.

Llandudno.

A—A. KENNERLEY, 3, Ty Gwyn Road.
C—MOUNTAIN HOUSE, South Parade.

Llangollen.

C—THE ROYAL HOTEL.

London, E.

A—W. A. BARNES, 10, Terrace Road, Upper Manor.
Information—Changing and developing. *Terms for Use*—6d. per hour. *Hours Open*—9 a.m to 8 p.m.

A—ALLEN, 10, Barking Road, Canning Town.

J. HUBERT, 238, Mare Street, Hackney.

London, E.C.

A—T. & H. DOUBLET, 11, Moorgate Street.
Information—Changing. *Terms for Use*—Free. *Hours Open*—8.30 a.m. to 7 p.m.

A—W. H. HARLING, 47, Finsbury Pavement.
Information—Changing. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 6 p.m. (Saturdays, 2 p.m.)

A—E. CHICK, 24, Woodbridge Street.
Information—Changing and developing. *Terms for Use*—Free by appointment. Chemicals charged for if needed.

A—ADAMS & Co , 81, Aldersgate Street.

A—DOLLAND & Co., 35, Ludgate Hill.

A—H. HUGHES & SON, 59, Fenchurch Street.

A—J. ORME & Co., 65, Barbican.

A—W. D. NORTH, 97, City Road.

A—LONDON STEREO Co., Cheapside.

A—MAYFIELD & Co., 41, Queen Victoria Street.

A—C. E. ELLIOTT, 36, Jewin Street.

A—G S. MARTIN, Bream's Buildings, Chancery Lane.

A—CITY SALE & EXCHANGE ROOMS, 54, Lime Street.

A—C. A. GANDY, 46, Old Broad Street.

London, N.

A—F. W. HART, 96, Stoke Newington Road.
Information—Changing and developing. *Terms for Use*—Changing, free to customers; developing, by arrangement. *Hours Open*—9 a.m. to 7 p.m. (Saturdays 2 p.m.)

A—E. SCAMELL, 4, Albert Terrace, Church End, Finchley.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 7 p.m.

A—E. T. CHURCH, 39, Highgate Hill.
Information—Changing and developing. *Terms for Use*—By arrangement. *Hours Open*—10 a.m. to 9 p.m.

A—W. H. HUMPHRIES & Co., 268, Upper Street, Islington.

A—R. H. WYNNE, 106, Seven Sisters Road.

A—F. P. FEAKS, 90, Newington Green Road.

C—FARLEIGH HOTEL, 277, Amhurst Road, Stoke Newington.

London, N.E.

A—R. BECKETT, 6, The Grove, Hackney.
Information—Changing and developing. *Terms for Use*—Changing free to customers; developing, including developer, half hour, 1s. 6d. *Hours Open*—9 a.m. till dusk.

London, N.W.

A—A. R. LAMBE, 245, High Road, Kilburn.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—10 a.m. to 9 p.m.

A—G. H. CARTER, 95, Torriano Avenue, Kentish Town.
Information—Changing and developing. *Terms for Use*—Changing free; developing, 6d. per hour. *Hours Open*—9 a.m. to 7 p.m.

A—E. PETTINGER, 49, High Street, Hampstead.

London, S.E.

A—BUTCHER & SON, Tranquil Vale, Blackheath.
Information—Changing and developing. Every convenience. *Terms for Use*—Free to purchasers. *Hours Open*—8 a.m. to 8 p.m.

A—HOWELL & SON, 81, High Street, Peckham.
Information—Changing. *Terms for Use*—No charge to customers. *Hours Open*—9 a.m. to 9 p.m.

A—BALDOCK & Co., 3, High Street, South Norwood.
Information—Changing and developing. *Terms for Use*—Free to purchasers. Trifling sum to others. *Hours Open*—9 a.m. to 9 p.m.

A—McCARTHY, 879, Old Kent Road.
Information—Changing and developing. *Terms for Use*—Changing free. All day 1s., or 4s. per week. *Hours Open*—10 a.m. to 10 p.m. every day except Thursday.

A—A. E. WADE, 177, Walworth Road.
Information—Changing and developing. *Terms for Use*—¼ pl., 1d.; ½ pl., 2d.; ¼ pl., 3d.; 1s. per week, or 3d. a time. *Hours Open*—8 a.m. to 10 p.m.

A—LEO ATKINSON & Co., 285, Brockley Road.
Information—Changing and developing. *Terms for Use*—Changing free to customers, to tourists 3d.; developing, cost of solutions. *Hours Open*—8.30 a.m. to 8 30 p.m.

A—PROSSER, ROBERTS, & Co., 13, Church Street, Camberwell.

A—LOCKYER BROS., 88, Evelyn Street, Deptford.

A—H. SENIER & Co., 88, Norwood Road.

A—T. R. PRIME, Upper Norwood.

London, S.W.

A—ARMY & NAVY AUXILIARY STORES, Francis Street.

A—S. H. R. SALMON, 10, The Terrace, East Putney.

A—M. JACOLETTE, Queen's Gate Studio, Harrington Road.

A—WEBSTER BROS., 25, The Pavement, Clapham Common.
Information—Changing. *Terms for Use*—Free to purchasers of plates, etc. *Hours Open*—9 a.m. to 7 p.m.

A—CLARKE & CLARKE, Clapham Junction.
Information—Changing. *Terms for Use*—3d. *Hours Open*—9 a.m. to 7 p.m.

A—JOHN BULBECK, 22, Sussex Street.

A—A. H. BOOL, 93, Harwood Road, Walham Green.

London, W.

A—C. W. BRUMWELL, 7, Lower Terrace, Notting Hill.
Information—Changing and developing. *Terms for Use*—Changing, 3d.; developing, 6d.; one dozen tickets, extending over any length of time, 5s. *Hours Open*—8 a.m. to 9 p.m.
A—W. A. SHEPHARD, 155, King Street West, Hammersmith.
Information—Changing. *Terms for Use*—3d. *Hours Open*—10 a.m. to 9 p.m.
A—WHITELEY, Westbourne Grove.
A—R. E. FAITHFUL, 3, Lower Terrace, Notting Hill.
A—LONDON STEREO Co., 106, Regent Street.
A—W. EMERY, 24, South Street, Baker Street.
A—WEBSTER BROS., 4, Porchester Road.

London, W.C.

A—PARKER & Co., 288, High Holborn.
Information—Changing and developing. *Terms for Use*—1s. per hour. *Hours Open*—9 a.m. till 7 p.m.
A—ADAMS & Co., 26, Charing Cross Road.
A—HOUGHTON & SON, 85, High Holborn.
A—WATSON & SONS, 313, High Holborn.
A—HINTON & Co., 38, Bedford Street, Covent Garden.
A—SANDS, HUNTER & Co., 20, Cranbourne Street.
A—J. FALLOWFIELD, 146, Charing Cross Road.

Long Eaton.

A—GEO. YOUNGMAN.

Louth.

A—MARK SMITH, Mercer Row.

Lowestoft.

A—J. W. D. HUME, The Grove Pharmacy.
Information—Changing and developing. *Terms for Use*—Changing free; developing, usual charge. *Hours Open*—10 a.m. to 8 p.m.

Ludlow.

A—G. WOODHOUSE, 45, Bull Ring.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—10 a.m. to 7 p.m.
A—T. JONES, 51, Broad Street.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—9 to 11 a.m.; 4 to 6 p.m.

Luton.

A—W. T. ROBERTS, 44, Church Street.
Information—Changing. *Terms for Use*—3d. *Hours Open*—9 a.m. to 8 p.m.

Lynmouth.

A—VICKERY BROS., Watersmeet Road.
Information—Changing and developing. *Terms for Use*—Small charge for developing and use of dark room. *Hours Open*—9 a.m. to 7 p.m.
A—GOODACRE BROS., Watersmeet Road.
A—A. RICKARDS, Watersmeet Road.

Lynn.

A—W. H. COCKLE, 59, High Street.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 7 p.m.
A—W. J. PALMER, Norfolk Street.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 7 p.m.

Maidenhead.

A—A. UPSON, 35, High Street.
Information—Changing and developing *Terms for Use*—Changing free to purchasers, 6d. to others; developing, 1s. per hour (or less). *Hours Open*—9 a.m. to 7 p.m.

Maidstone.

A—F. R. JENNINGS, 7, London Road, and 85, Week Street.
Information—Changing at both places, but most conveniently at Week Street. *Terms for Use*—Free. *Hours Open*—Not stated.

Malvern.

A—W. & J. BURROW, Belle Vue Terrace.
Information—Changing and developing. *Terms for Use*—6d. per hour. *Hours Open*—9 a.m to 6 p.m.
A—C. J. & E. GROSVENOR, 3, Belvoir Terrace.
Information.—Changing and developing. *Terms for Use*—Changing, 3d.; developing, with use of dishes, 1s. per hour. *Hours Open*—8 a.m. to 8 p.m.

Manchester.

A—E. W. JACKSON, 71, Oxford Street.
Information—Changing. *Terms for Use*—Free to customers. *Hours Open*—Not stated.
A—J. T. CHAPMAN, Albert Square.
A—HOLMES, SADLER & HOLMES, 24, Southall Street.
A—O. J. WEAKLEY, 87, City Road.
A—J. AMBLER, 5, Market Street.
A—W. BATTERSBY, 26, Victoria Street.
A—S. F. FLOWER, 111, Grosvenor Street, All Saints.

Mansfield.

A—AGAR BROS., 14, West Gate.
Information—Changing and developing. *Terms for Use*—6d. per hour (or less), and for chemicals as used. *Hours Open*—9 a.m. to 7 p.m.

Margate.

A—W. S. HARVEY, 20, Market Place.

Information—Changing and developing. *Terms for Use*—Changing, 6d. per week, developing 2s. per week. *Hours Open*—8 a m. to 10 p.m. (Sundays excepted).

A—G. E. HOUGHTON, Fort Road.

Information—Changing and developing. *Terms for Use*—Changing 3d. per day; developing, 1s. 6d. per hour with chemicals, 1s. per hour with own chemicals. *Hours Open*—9 a.m. to dusk.

Melton Mowbray.

A—MILNER, Cheapside.

Middlesbrough.

A—J. C. ROBSON, 37, Linthorpe Road.

Montrose, N.B.

A—A. DAVIDSON, 172, High Street.

Information—Changing and developing. *Terms for Use*—Changing free, developing price of chemicals. *Hours Open*—8 a m. to 8 p.m.

Nelson.

A—S. JESSOP, 96, Manchester Road.

Newark.

A—J. H. SMITH, Bridge Street.

Information—Changing and developing. *Terms for Use*—1s. per hour. *Hours Open*—8 a.m. to 8 p.m.

A—H. FISHER, 26, Stodman Street.

New Eltham (Kent).

A—LOCKYER, The Parade.

Newcastle-on-Tyne.

A—F. K. HURMAN & Co., 2, St. Nicolas's Buildings.

A—J. WATSON, 34, Grainger Street.

A—P. HALL, 118, Grey Street.

A—E. J. REES & Co., 35, Seventh Avenue.

A—MAWSON & SWAN, 11, Mosley Street.

Newmarket.

A—H. R. SHERBORN, High Street.

Information—Changing and developing. Not open for amateurs. *Terms for Use*—Scale of charges for developing. *Hours Open*—9 a.m. to 7 p.m.

Newport (Mon.)

A—A. E. ATKINS, Commercial Street.

A—TOWNSEND CYCLE Co., 133, Commercial Street.

Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—Usual business hours.

Newport (I. of W.)

A—C. KNIGHT, 108, High Street.
Information—Changing. *Terms for Use*—Free to customers. *Hours Open*—All day.

Newquay (Corn.)

A—F. WARREN, stationer.

Newton Abbot.

A—E. MUDFORD, 55, Queen Street.

Northampton.

A—J. POWELL, 62, Mayfair.
A—F. WRIGHT, 58, Abington Street.

North Shields.

A—IRVIN, Bedford Street.
Information—Changing and developing. *Terms for Use*—Free to customers. Charges for other uses on application. *Hours Open*—9 a.m. to 7 p.m.

Northwich.

A—J. W. DEAKIN, 36, Witton Street.
Information—Changing and developing. *Terms for Use*—Usual average terms.

Norwich.

A—A. E. COE, 32, London Street.
Information—Changing and developing. *Terms for Use*—Changing free; developing, chemicals charged for. *Hours Open*—10 a m. to 5 p.m.
A—W. T. DAWSON, 76, Prince of Wales's Road.
Information—Changing and developing under the supervision of a skilled photographer. *Terms for Use*—Cost of materials, etc. *Hours Open*—8.30 a.m. to 8.30 p.m.
A—C. BRAND & Co., 75, Dereham Road.

Nottingham.

A—J. TAYLOR, 11, Bridlesmith Gate.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 8 p.m.
A—SHEPPERLEY, Long Row.
A—C. E. MARSDEN, 14, Denman Street, New Radford.
A—W. BAKER, 8, Derby Road.

Oban.

A—S. LAWRENCE, 101, George Street.
Information—Changing and developing. *Terms for Use*—No charge for changing plates sold by the owner; small charge for developing. *Hours Open*—10 a.m. to 6 p.m. (Sundays excepted).

Oldham (Lancs.)

A—C. G. WOOD, 30, High Street.
Information—Changing. *Terms for Use*—Free to customers; 3d. per dozen plates to others. *Hours Open*—8 a.m. to 8 p.m.
A—J. WRIGLEY, 90, Union Street.
A- S. KNOTT, 55, Yorkshire Street.

Oxford.

A—J. SQUIRE, 41, Queen Street.

Penrith.

A—J. COWPER, 50, King Street.
Information—Changing and developing. *Terms for Use*—Solutions only charged for. *Hours Open*—Night and day.
A—E. B. GRIERSON, Corn Market.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—8 a.m. to 7 p.m.

Penzance.

A—A. H. BUCKETT, 22, Market Place.
Information—Changing and developing. *Terms for Use*—Changing 3d., developing 6d. per half-hour. *Hours Open*—8.30 a.m. to 7 p.m.
A—R. H. PRESTON, 40, Market Place.
Information—Changing and developing. *Terms for Use*—1s. per hour or less, including use of alum and hypo baths. *Hours Open*—9 a.m. to 8 p.m.
A—D. WATSON, 15, Market Place.

Pershore.

A—WM. DOWTY, High Street.
Information—Changing and developing. *Terms for Use*—6d. *Hours Open*—All hours.

Perth.

A—J. CAMPBELL, 41, George Street.

Peterborough.

A—H. E. NOBLE, New Road.
Information—Changing and developing. *Terms for Use*—By arrangement. *Hours Open*—9 a.m. to 8 p.m.
A—J. W. BODGER, 18, Cowgate.
Information—Changing and developing. *Terms for Use*—Usual terms. *Hours Open*—7.30 a.m. to 8 p.m.

Petersfield.

A—W. B. EDGELER, chemist.

Plymouth.

A—J. HODGE, Union Street.
Information—Changing and developing (separate rooms). *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p.m.
A—W. HEATH, 24, George Street.

Portland.

A—A. PARSONS, 1, Victoria Buildings.

Preston.

A—W. J. T. JACKSON, 55, Fishergate.
Information—Changing and developing. *Terms for Use*—No charge. *Hours Open*—8 a.m. to 9 p.m.

Ramsgate

A—EDWARD BAILY, 9, Queen Street.
Information—Changing and developing. *Terms for Use*—Changing 6d. per week, developing 1s. per week. *Hours Open*—10 a m. to 8 p.m.
A—PAVEY & Co., 104, High Street.
A—FRANK THOMPSON, 15, Queen Street.

Rawtenstall.

A—J. TAYLOR, Albion House.

Reading.

A—F. H. DANN, 35, Broad Street.
Information—Changing. *Terms for Use*—No charge. *Hours Open*—8 a.m. to 8 p.m.

Redhill.

A—J. MERRETT, 28, Station Road.

Retford.

A—C. J. TELBIN, 8, Market Place.

Rhayader.

A—R. W. JONES, chemist.
Information—Changing and developing *Terms for Use*—Free. *Hours Open*—9 a.m to 6 p.m.

Richmond (Surrey).

A—BOURN BROS., Hill Rise.
Information—Changing and developing. *Terms for Use*—Free to purchasers. Chemicals as used. *Hours Open*—8.30 a.m to 8 p.m.

Richmond (Yorks.)

A—G. R. WALTON & Co., The Pharmacy.
Information—Changing. *Terms for Use*—6d. *Hours Open*—9 a.m. to 6 p.m.

Ripley.

A—W. A. SHEPHARD, chemist.

Ripon.

A—J. H. BAYLEY, 20, High Skellgate.

Rochdale.

A—J. W. BAMFORD, 242, Yorkshire Street.
Information—Changing and developing. *Terms for Use*—Free; chemicals charged for. *Hours Open*—9 a.m. to 8 p.m. (Tuesdays 5 p.m.)

Rochester.

A—J. S. HEWITT, 97, Eastgate.

Romford.

J. W. LASHAM, chemist.

Information—Changing and developing. *Terms for Use*—Free to purchasers; nominal charge to others. *Hours Open*—8 a.m. to 8 p.m. (Sundays excepted).

Roscrea.

A—W. K. BOURKE, Castle Street.

Information—Changing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 9 p.m.

Ross.

A—CHAS. HALL, Gloucester Road.

Information—Changing and developing. *Terms for Use*—Changing, 3d. developing 6d., customers free. *Hours Open*—9 a.m. to 7 p.m.

Rotherham.

A—JAMES LEADBEATER. 5, Frederick Street.

Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 7 p.m.

Royston.

A—F. R. HINKINS, Kneesworth Road.

Information—Changing. *Terms for Use*—Free. *Hours Open*—Any hour, day or night.

Ryde (I. of W.)

A—TENISON SMITH, Union Street.

Information—Changing and developing. *Terms for Use*—Depends upon time or number of plates developed. *Hours Open*—8 a.m. to 8 p.m.

Saffron Walden.

A—W. HOBBS, Gold Street.

Saltburn-by-Sea.

A—J. J. HALLAM, 11, Amber Street.

Information—Changing and developing. *Terms for Use*—Changing free; developing, ¼ plate, 1s. per dozen; ½ plate, 2s. per dozen; ¼ plate, 3s. 6d. per dozen. *Hours Open*—8 a.m. to 9 p.m.

Sandgate.

A—W. H. JACOB, 3, High Street.

Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 7.30 p.m.

Sandown (I. of W.)

A—JAS. DORE, 27, High Street.

Information—Changing and developing. *Terms for Use*—No charge for changing plates purchased; developing, 6d. per hour, customers to find all developers, &c. *Hours Open*—Available generally at any hour.

Scarborough.

A—W. PARKER, 96, Westborough and 29, Ramshill Road.
Information—Changing and developing. *Terms for Use*—Changing free; developing, ¼ plate, 1s. per dozen; ½ plate, 2s. per dozen; ¼ plate, 3s. per dozen. *Hours Open*—8 a.m. to 9 p.m.
A—J. WHITFIELD, 113, Westborough.
C—MRS. MARRIOTT, 25, St. Nicholas Cliff.

Settle.

A—E. HANDBY, Duke Street.
A—A. HORNER, Market Place.

Shanklin (I. of W.)

A—POSTBURY, 4, Hope Road.

Sheffield.

A—JAS. CHRISTIE, 129, West Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—10 a.m. to 6 p.m.
—HIBBERT BROS., 117, Norfolk Street.
Information—Changing and developing. *Terms for Use*—No charge. *Hours Open*—9 a.m. to 7 p.m. (Saturdays 4 p.m.)
A—L. F. PEACOCK, 104, Gell Street.
Information—Changing and developing. *Terms for Use*—Changing, 3d.; developing, according to requirements. *Hours Open*—7 a.m. till dusk, or later by appointment.
A—J. PRESTON, 4, High Street.
A—SHEFFIELD PHOTO Co., Fargate.
A—J. GARDNER, 485, Glossop Road, Broomhill.
A—K. MATTISON, 169, Spital Hill.

Shipley.

A—DEWHIRST & DOBSON, 8, Saltaire Road.

Shrewsbury.

A—HICKIN & PYEFINCH, Mardol Head.
Information—Changing and developing. *Terms for Use*—Changing, 1s.; developing, by agreement. *Hours Open*—10 a.m. to 6 p.m.
A—DELLA PORTA & Co., Princess Street.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—9 a.m. to 7 p.m. (Thursdays 1.30 p.m.)
A—SALOP STATIONERY STORES, 7, The Square.

Sidcup.

A—A. W. DEWEY.

Silloth.

A—H. J. SMITH, 4, Esk Street.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—8.30 a.m. to 6 p.m.

Southampton.

A—F. SHALDERS, 17, High Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a m. to 8 p.m.
A—W. MARTIN, 112, High Street.
Information—Changing and developing. *Terms for Use*—Customers free, nominal charge to visitors. *Hours Open*—8 a.m. to 10 p.m.
A—ADAMS & SCANLAN, 32, High Street.
A—H. LONG, 3, Hanover Buildings.

Southend.

A—G. R. DAWSON, 42, High Street.

Southport.

A—J. R. CAVE, 52, Nevill Street.
Information—Changing and developing. *Terms for Use*—Changing 2d., developing 6d. per hour. *Hours Open*—8 a.m. to 10 p.m.
A—A. FRANKS, 137, Lord Street.
Information—Changing and developing. *Terms for Use*—No charge. *Hours Open*—9 a.m. to 7 p.m.
A—G. CROSS, 15, Cambridge Arcade.

Southsea.

A—G. KNIGHT, 29, Middle Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 10 p.m.
A—RASTRICK & SONS, King's Road.
A—W. H. COOKE, 2, Landport Terrace.

Southwell.

A—A. J. LOUGHTON, Market Place.
Information—Changing and developing. *Terms for Use*—Changing 3d.; developing, including dishes, hypo, &c., 1s. *Hours Open*—8 a.m. to 8 p.m.

Spilsby.

A—J. J. RAINEY, Church Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 8 p.m.

St. Andrew's, N.B.

A—SMITH & GOVAN, 109, South Street.
Information—Changing and developing. *Terms for Use*—By agreement. *Hours Open*—8 a.m. to 8 p.m.

St. Bees.

A—R. W. BROOMFIELD, Main Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—Up to 7 p.m.

St. Ives.

A—W. TREVORROW, Treganna Place.

St. Leonards.

A—F. ROSSITER, HEMPSTED & Co., 14, Grand Parade.
Information—Changing and developing. *Terms for Use*—Changing free; developing, 1s. 6d. *Hours Open*—All day.

St. Neots.

D—Rev. G. A. GRAHAM.

St. Ronans.

A—W. EASTON, Drug Stores.

Stalybridge.

A—D. INNES, 47, Melbourne Street.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—8 a.m. to 8 p.m.

Stamford.

A—F. DICKINSON, 13, St. Mary Street.
Information—Changing and developing. *Terms for Use*—Changing 6d., free to customers; developing, according to requirements. *Hours Open*—8 a.m. to 6.30 p.m.
A—COTNAM FIELDS, 66, Scotgate.
Information—Changing and developing. *Terms for Use*—Moderate. *Hours Open*—8 a.m. to 8 p.m.
A—G. A. NICHOLS, 30, St. Peter's Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. till dusk.

Stockport.

A—B. COOPER, 54, Chestergate.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 8 p.m. (Thursday, 1.30 p.m.)

Stockton-on-Tees.

A—F. A. GRAHAM, 4, Mill Lane.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p.m.
A—W. CLARKE, 153, High Street.

Stoke Ferry.

A—H. W. HAROLD, Bridge Road.
Information—Changing and developing. *Terms for Use*—Changing 3d, developing 6d. *Hours Open*—8 a.m. to 8 p.m.

Stoke-on-Trent.

A—J. H. ADAMS & Co., High Street.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—8 a.m. to 8 p.m.

Stony Stratford.

A—J. B. GRAVES & Co., High Street.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—8 a.m. to 7 p.m.

Stourbridge.

A—F. W. BIGGS, 151, High Street.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—8.30 a.m to 10 p.m.
A—COOKE, Limited, 154, High Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 9 p.m.

Stratford-on-Avon.

A—R. HAWKES, 33, High Street.
Information—Changing and developing. *Terms for Use*—According to circumstances. *Hours Open*—9 a.m. to 7 p.m.

Stroud.

A—S. J. COLEY, chemist.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—10 a.m. to 6 p.m.

Sunderland.

A—J. WALTON & SON, 298, High Street West.
Information—Changing and developing. *Terms for Use*—Changing free, small charge for developing. *Hours Open*—8 a.m. to 8 p.m.
A—WILKINSON & Co., 15, Holmside.

Surbiton.

A—C. LOWE, chemist.

Swansea.

A—H. H. PARLBY, 9, Cradock Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 11 p.m.
A—C. H. EVANS, 12, St. Helen's Road.

Swindon Hill.

A—J. GREEN & Co., chemists.

Tarporley.

A—WATSON, The Terrace.

Taunton.

A—J. CHAFFIN & SONS, 65, East Street.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p.m.

Tavistock.

A—H. T. DOBLE & SONS, chemists.
Information—Changing and developing. *Terms for Use*—Changing free, developing nominal charge. *Hours Open*—9 a.m. to 6 p.m.

Teignmouth.

A—VALENTINE & SONS, 9, Somerset Place.
Information—Changing and developing. *Terms for Use*—Changing, 3d.; developing, 6d. half-hour. *Hours Open*—10 a.m. to 7 p.m.

Todmorden.

A—H. B. PARE, 6, Water Street.

Torquay.

A—HORTON & Co., chemists.
Information—Changing and developing. *Terms for Use*—Moderate. *Hours Open*—Any time.

A—W. BATHE, 24, Fleet Street.
Information—Changing and developing. *Terms for Use*—Free to customers, small charge to others. *Hours Open*—9 a.m. to 9 p.m.

A—COX & DURRANT, 8, Victoria Parade.
Information—Changing and developing. Special room for amateurs. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p.m.

A—E. A. HOLLOWAY, 34, Fleet Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—Night and day.

A—J. TAYLOR, Lucius Street.

A—J. TOZER, 70, Fleet Street.

Tunbridge Wells.

A—B. WHITROW, 15, St. John's Road.

Tynemouth.

A—T. O. MAWSON, 12, Percy Park Road.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 7 p.m.

Uckfield.

A—E. H. FARR, High Street.
Information—Changing and developing. *Terms for Use*—Changing free. Small charge for developing. *Hours Open*—8 a.m. to 10 p.m.

Usk.

A—H. DUNNING, Bridge Street.
Information—Changing only. *Terms for Use*—Free. *Hours Open*—10 a.m. to 5 p.m.

Uttoxeter.

A—A. PARKER, High Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—9 a.m. to 6 p.m.

A—A. McCANN, High Street.

Wakefield.

A—J. L. CHAPLIN & SON, 60, Westgate.
Information—Changing and developing. *Terms for Use*—Changing 3d., developing 6d. per hour, both free to customers. *Hours Open*—8 a.m. to 7.30 p.m.
A—G. & J. HALL, 9, Westg te.

Warrington.

A—HILL & CO., Buttermarket Street.
Information—Changing and developing. *Terms for Use*—No fixed charges. *Hours Open*—9 a.m. to 8 p.m.
A—M. ECKERSLEY, 33, Bridge Street.

Waterford.

A—J. CAREW, 46, St. John's Hill.
Information—Changing and developing. *Terms for Use*—1s. 6d. per hour or part of hour. *Hours Open*—10 a.m. to 5 p.m.

Watford.

A—WM. COLES, 60, Queen's Road.
Inform ation—Changing and developing. *Terms for Use*—Changing 6d., developing 9d. per hour. *Hours Open*—9 a.m. to 6 p.m.

Wellingborough.

A—F. SIMCO, 23, Market Street.

West Hartlepool.

A—J. C. WINN, chemist.
A—R. CLENNETT, 25½, Lynn Street.

West Malling.

H. C. Oliver, High Street.
An introduction can be given to a private gentleman if satisfactory references are produced.

Weston-super-Mare.

A—A. PUMPHREY, 5, Bristol Road.
Information—Changing and developing. *Terms for Use*—Changing 3d., developing 6d. half hour, 3s. 6d. per week. *Hours Open*—9 a.m. to 7 p.m.
A—H. C. PARKES, 34, Upper Church Road.
Information—Changing and developing. *Terms for Use*—Changing free to customers, developing 6d. per hour, 3s. 6d. per week. *Hours Open*—8 a.m. to 8 p.m.

Weymouth.

A—WHEELER & CO.
A—TARGETT, chemist.

Whitby.

A—JOHN BROOKS, 15, Flowergate.
Information—Changing and developing. *Terms for Use*—Changing free to customers, developing 6d. per half hour, 3s. 6d. per week. *Hours Open*—8 a.m. to 9 p.m.
A—F. H. BOWES, Skinner Street.

Whitehaven.

A—G. C. GASS, 12, King Street.
Information—Changing and developing. *Terms for Use*—Changing or developing free to customers. *Hours Open*—8 a.m to 7 p.m.

Wigan.

A—J. H. ATHERTON, 9, Market Street.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—8 a.m. to 9 p.m.

Wimbledon.

A—H. MITCHELL, High Street.
Information—Changing and developing. *Terms for Use*—Changing free to customers, developing 1s. *Hours Open*—9. a.m to 9 p.m.

Winchester.

A—GIBB, 31, High Street.
Information—Changing and developing. *Terms for Use*—Changing 6d., developing 1s. *Hours Open*—8 a.m. to 8 p.m.

Wisbech.

A—J. KENNERELL, 8 and 9, High Street.
Information—Changing and developing. *Terms for Use*—Changing at any time, developing by arrangement. *Hours Open*—8 a.m. to 10 p.m.
A—W. T. OLDHAM & SON, 10, Market Place.
Information—Changing and developing. *Terms for Use*—Free to customers. *Hours Open*—8 a.m. to 8 p.m. (Wednesday, 4 p.m.)

Wolsingham.

A—A. PICKARD, High Street.

Wolverhampton.

A—T. M. LAWS, 41, Darlington Street.
Information—Changing and developing. *Terms for Use*—Moderate charges. *Hours Open*—9 a.m. to 7 p.m.

Woodbridge.

A—T. BLANDEN, Castle Street.
Information—Changing and developing. *Terms for Use*—Changing, 3d.; developing, 6d. per half-hour; 3s. 6d. per week. *Hours Open*—All day.
A—A. S. FISK, St. John's Street.
A—E. J. EATON, chemist.

Jonathan Fallowfield,

CENTRAL PHOTOGRAPHIC STORES,

146, CHARING CROSS ROAD, LONDON, W.

Hand Cameras

FALLOWFIELD
RUNS THREE OF HIS OWN.

THEY ARE
THE REDOUBTABLE

Facile,

THE SCIENTIFIC

Miall,

And the Novelty,

THE FALLOWFIELD.

Each Camera has its own distinctive feature.

THE PRICES ARE—

	£	s.	d.
"The Facile" -	3	13	6
" " -	5	5	0
" " -	6	6	0
"The Miall" -	9	15	0
"The Fallowfield"	7	17	6

See following pages.

You must have one or the other.

THE BOOM OF THE DAY.

THE BOOM OF THE DAY.

THE BOOM OF THE DAY.

THE BOOM OF THE DAY.

THE BOOM OF THE DAY.

Hand Cameras

FALLOWFIELD
RUNS THREE OF HIS OWN.

THEY ARE
THE REDOUBTABLE

Facile,

THE SCIENTIFIC

Miall,

And the Novelty,

THE FALLOWFIELD.

Each Camera has its own distinctive feature.

THE PRICES ARE—

	£	s.	d.
"The Facile" -	3	13	6
" " -	5	5	0
" " -	6	6	0
"The Miall" -	9	15	0
"The Fallowfield"	7	17	6

See following pages.

You must have one or the other.

FACILE. FALLOWFIELD. MIALL.

WHEN LOOKING AROUND!!!

FOR A CAMERA!!!

GET ONE THAT YOU CAN PRODUCE PICTURES WITH.

THIS IS POSSIBLE WITH ALL THE CAMERAS I OFFER.

THE PHENOMENAL SUCCESS OF

The 'FACILE'

HAS REACHED EXTRAORDINARY FIGURES.

IT IS UNDOUBTEDLY THE

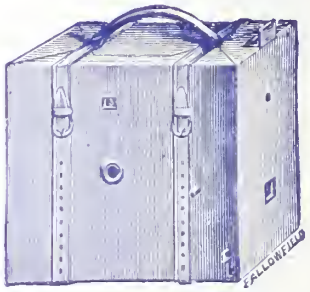
MOST PERFECT PLATE CHANGER

EXTANT. SIMPLICITY COMBINED WITH CELERITY.

THE SUCCESS OF THREE SEASONS IS A TRIUMPH FOR THE FOURTH.

THE "FACILE" HAND CAMERA.





SPECIAL NOTICE IS DIRECTED TO THE FOLLOWING:—

"FACILE," with Rapid Landscape Lens of wonderful definition and Sunk Identical Finder £3 13 6

"FACILE," with 5 x 4 Rapid Rectilinear Lens, four Rotating Stops, F 8, 11, 16, and 22, and Sunk Identical Finder 5 5 0

Automatic Lens Cover and Stops to lids of Boxes.

Ditto, ditto, covered morocco leather 6 6 0

LEATHER CASES, WRAPS, &c., FOR "FACILE" HAND CAMERA.

New Flexible Waterproof Covers in brown, black, or tweed ... ... each £0 7 6
And in Morocco 0 15 0

When ordering send full size paper pattern of front and right-hand side, marking openings and projections; say also if with or without Finder.

Solid Leather Case to carry "Facile" £1 5 0
Mail Cloth 0 15 0
New Leather Covers to cover "Facile" when in use, rigid... ... ... 1 0 0

If these are ordered it will always be the better plan to send up Camera for measurement to ensure accurate fit.

NEW "FACILE" ALBUM

For Mounting Views 4 x 5, size 5¾ x 4¾, containing 12 leaves, to hold 24 pictures, in cream or French grey; bound cloth, **1 9** each, post free.
This completes the whole arrangement, and is a pleasing memento.

146, CHARING CROSS ROAD, LONDON, W.

[*See preceding and following pages.*

THE "SCIENTIFIC."

FALLOWFIELD'S

"MIALL" HAND CAMERA.



FITTINGS UNDERNEATH "MIALL."



The **"MIALL"** holds 12 plates or films, $4\frac{1}{4} \times 3\frac{1}{4}$, and each Store Box carries 12 more. Its outside size is 10x7x6, and its weight about 5lbs. It resembles so exactly a small Gladstone bag that it is really a "Detective" Camera.

The Lens is similar to the one which has made such a reputation for my "Facile," being an R R of $5\frac{1}{2}$in. focus. Each one is guaranteed perfect in definition and covering power. An Iris Diaphragm is fitted, which can be instantly adjusted from outside at F/8, 11, 16, 22, 44, by means of the Lever Arm and Indicator **D**.

The Shutter works between the Lenses, and by the Speed Indicator **E** can instantly be set to work at $\frac{1}{10}$ $\frac{1}{25}$ $\frac{1}{50}$ $\frac{1}{100}$ second. **F** is the Setter, and it is instantly released by touching the trigger **G**. If the shutter **F** is held back by the Arm **H** an exposure of any length may be given by using only the Safety Shutter **G**, which works automatically, so that the process of setting Shutter cannot expose a plate.

Focussing is instantly done by adjusting the arm **C** at any distance for 6, 8, 10, 12, 14, or 16 feet, after which it works at fixed focus, all distances beyond being perfectly sharp.

Finders are of the well-known "Facile" pattern, sunk down deep in Camera, and giving both vertical and landscape views identical with the view on plate at the moment of exposure.

Plate Changing is effected by simply pulling down the handle **A** and pushing it hard back again. This brings down a fresh plate from the horizontal to the vertical position, and holds it firmly in register. The Indicator **B** shows the number of the plate actually in position. Unless turned upside down nothing can render a hitch possible in changing. When all 12 plates are passed through, 12 more can be inserted from Store Box, which is then ready to take out the 12 exposed plates in the brightest sunlight if necessary.

The **"MIALL"** is fitted with Socket **J** to take screw when fitted to Stand or Tripod for long exposures.

The **"MIALL"** is suitable for Portraiture, Landscape, or Architectural work.

The **"MIALL"** can be made in any size to order, and customers' own Lens can be fitted if preferred.

Price, covered in best Leather or Morocco, including one Patent Store Box, £9 15s. Extra Store Boxes, complete, 15s. each.

☞ THIS CAMERA IS MADE ONLY TO ORDER ☜

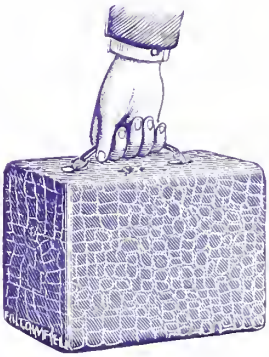
146, CHARING CROSS ROAD, LONDON, W.

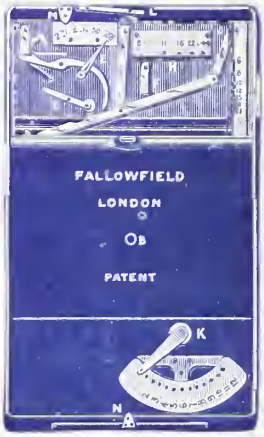
(*See preceding and following pages.*

THE

"FALLOWFIELD"

HAND CAMERA





COMBINES the advantages o the "Facile" and "Miall" Hand Cameras, being a Magazin Camera, holding twelve or more plates at a time, and has in addition the advantage of a fixed full-sized ground-glass screen, on which the actua picture can be seen and focussed for either landscape or vertical view when desired—just as in an ordinary camera.

Any plate can be exposed at will, so that various rapidities can be carried in each store box. The store boxes can be taken out and replaced in the brightest sunlight. The Iris diaphragm, speed shutter and focussing arrangements are all worked from below, the whole movements being concealed and protected by a vulcanite shutter when not in use. The plate changing is as reliable and even more simple than the "Facile." It is fitted with lock and key, and all parts are well made and fitted, the whole being carefully tested and guaranteed perfect in all respects.

—*—

PRICE	(Covered in best Morocco, including One Store Box with Sheaths complete)..	**£7 17 6**
„	(Extra Store Boxes, complete with Sheaths) .. .. .. Each	**0 15 0**

146, CHARING CROSS ROAD, LONDON, W.

[*See preceding and following pages.*

"FALLOWFIELD"

HAND CAMERA.

THE "FALLOWFIELD" holds 12 plates or films, $4\frac{1}{4} \times 3\frac{1}{4}$, and each Store Box carries 12 more. Its outside size is $5\frac{3}{4} \times 9\frac{1}{4} \times 11\frac{1}{2}$, and its weight 5 lbs. It is fitted with lock and key, and resembles so nearly a small dressing case that it is truly a "detective" camera.

THE LENS is the well-known "Facile" R.R. of $5\frac{1}{2}$in. focus; each one being guaranteed perfect in definition and covering power. The Iris diaphragm can instantly be adjusted at *f*8, 11, 6, 22, 44 from outside by the indicator and lever arm H. The lens is uncapped by release at L, when the small spring flap flies open and forms a sky shade.

THE SHUTTER works between the lenses, and by the speed indicator E can instantly be set to work at 2, 1, $\frac{1}{2}$, $\frac{1}{10}$, $\frac{1}{50}$, $\frac{1}{100}$ second, C being the setter and D the release, which also automatically works the interior safety flap shutter behind the lens, so that the plate cannot be exposed while setting the shutter C. If C shutter is caught by the small arm a prolonged exposure can be given by release D, which can be held back indefinitely by catch F.

FOCUSSING can be done by the arm I on the scale shown, from four feet up to fixed focus (FF) for distant views, or it can be done visually (as in ordinary cameras) by means of full size screen, which forms back of plate box when indicator K is pointed to O and the back of camera opened at N. *N.B.*—Of course all plates must be returned to top chamber during this operation, and any plates then brought into position will fall into precise position of focussing screen.

FINDERS are of the well-known "Facile" pattern, sunk down deep in camera close above lens, and giving identical view, either landscape or vertical, at the moment of exposure, by an ingenious arrangement, one opening answering for both, the vertical finder being pressed into position with finger when required.

PLATE CHANGING is most reliable and simple, and is effected by pointing the arm K to whatever number of plate is wanted for exposure. The 12 can either be exposed in rotation or in any order desired. By reversing the camera all the plates (or any of them) can always be returned to the top chamber and taken out in store box, when a box of 12 more can be inserted, all being done without any dark room, and in bright sunlight if necessary.

THE "FALLOWFIELD" is fitted with sockets B for landscape view, and similar socket at side for vertical view when fixed on stand or tripod.

"FALLOWFIELD" is suited for Portraiture, Architecture, Landscape or Snap-shot work, having all the advantages of portability of H.C. and advantages of ordinary.

146, CHARING CROSS ROAD, LONDON, W.

[*See preceding and following pages.*

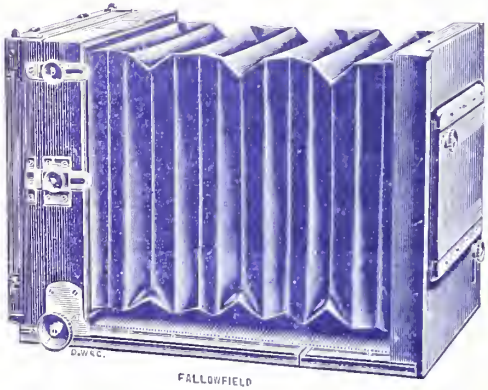
Fallowfield for Cameras

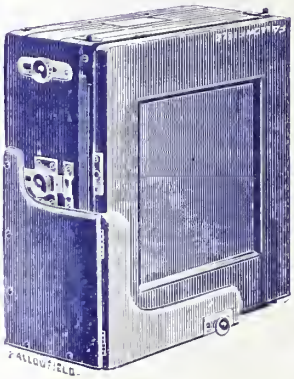
SEE ANNUAL FOR DETAILED DESCRIPTIONS, 33 PAGES OF CAMERAS.

FALLOWFIELD'S ORIGINAL "SPECIAL" CAMERA.

The most Perfect Durable Instrument yet Devised.

SIMPLICITY & STRENGTH, ELEGANCE & EASE.





A Square Camera, Reversible Back, and Swing Back.

For Plates. Inches.	Price with 1 Double Dark Slide, and 2 Inner Frames, in one slide only.
4¼ × 3¼	£3 4 0
5 × 4	3 12 0
6½ × 4¾	4 4 0
7¼ × 4½	4 8 0
8 × 5	4 10 0
8½ × 6½	5 1 0
10 × 8	6 2 0
12 × 10	7 2 0
15 × 12	9 4 0
18 × 16	12 10 0
20 × 16	14 0 0
22 × 18	15 10 0
24 × 20	17 10 0

Centimètre.	Price complete with 1 Double Slide.	Extra Slides.
9 × 12	£3 12 0	£0 13 6
12 × 15	4 4 0	0 15 0
13 × 18	4 8 0	0 18 0
12 × 20	4 10 0	0 18 6
15 × 21	5 1 0	1 0 0
18 × 21	5 15 0	1 4 0
15 × 22	6 0 0	1 4 0
18 × 24	6 10 0	1 5 0
21 × 27	7 2 0	1 10 0
24 × 30	8 10 0	1 12 0
27 × 33	9 4 0	1 15 0
27 × 35	9 16 0	1 18 0
30 × 40	11 15 0	2 3 0
40 × 50	15 0 0	3 0 0
50 × 60	19 10 0	3 16 0

EXTRA DOUBLE DARK SLIDES.

Inches.	Price.	Inches.	Price.	Inches.	Price.
4¼ × 3¼	£0 13 0	8 × 5	£0 18 6	15 × 12	£2 0 0
5 × 4	0 13 6	8½ × 6½	1 0 0	18 × 16	3 0 0
6½ × 4¾	0 15 0	10 × 8	1 4 0	20 × 16	3 6 0
7¼ × 4½	0 18 0	12 × 10	1 10 0	22 × 18	3 12 0
		24 × 20	£3 16 0		

All made of Specially Seasoned Woo , Selected with greatest care.

146, CHARING CROSS ROAD, LONDON. W.

[*See preceding and following pages.*

Photographic
SENSITISED PAPERS.

The Central Photographic Stores

Have long enjoyed the reputation of dealing and supplying only strictly reliable articles, and

THE "PREMIER" SENSITISED PAPERS

Proudly takes pride of place as the best in the market.

PRICES AS FOLLOWS:

	Sheet.	¼-Quire.	½-Quire.	Quire.
No. 1.—9 Kilo. White, Pink, or Mauve ...	-/8	3/6	6/9	12/6
No. 3.—10 Kilo. White or Pink ...	-/10	4/3	7/6	14/6
No. 4.—Saxe. Pink only.	-/8	3/6	6/9	12/6

Post Free. *Cash with Order.*

READY CUT FOR MOUNTING.

C.-D.-V.'s OR CABINETS.

1 Sheet ... ... -/10	¼-plate	2/9	per 100
¼ Quire 4/3	½ „	6/6	„ 100
½ „ 7/9	7½ x 5	7/3	„ 100
1 „ 14/6	Whole-plate	10/6	„ 100
Sheet Packets: 43 C.-D.-V.'s, 15 Cabinets.	10 x 8	10/6	„ 50
„ „ 25 ¼-plates or 10 ½-plates.	12 x 10	13/6	„ 50
All packed in single sheets.	15 x 12	20/-	„ 50

The quickest Printing Paper and richest in Silver on the Market.

SPECIAL TONING BATHS for use with above (ready for use), 1/3 per Pint

FALLOWFIELD'S
NEW CHLORIDE OF SILVER EMULSION PAPERS.

(GELATINE OR CELLOIDIN.)

Demand for the past three seasons have each season quadrupled itself, sufficient evidence of its great superiority over other brands.

Exported to every quarter of the habitable globe.

Packed in the following Sizes:—

		White or Pink.			White or Pink.
12	4 x 3	-/8	12	7 x 5	1/6
25	4 x 3	1/4	25	7 x 5	3/-
12	6 x 4	1/-	12	8½ x 6½	2/-
25	6 x 4	2/-	12	9 x 7	2/-
12	6¼ x 4¾	1/6	12	10 x 8	5/-
25	6½ x 4¾	3/-	12	12 x 10	7/-

SPECIAL COMBINED TONING AND FIXING BATH (ready for use), 2/3 per Pint.

146, CHARING CROSS ROAD, LONDON, W.

[*See preceding and following pages*]

B.A. BEATS Them ALL.	BEST OF ALL	BETTER THAN ALL

Fallowfield's Photographic Annual

For 1892.

Ready in June; will be "up to date" thoroughly. Post free anywhere **One Shilling in stamps.** *Foreign stamps from abroad accepted.*

HOW TO BUY.

GET *"My Traveller,"*

Published monthly, and you will see.

My Stock of **MOUNTS** have no equal in the trade for variety, purity and quality. It is impossible to give detailed list in a small space. Fullest particulars on application.

CHEMICALS.—Purity and quality dominate all my purchases.

COMPLETE SETS, of extraordinary value, ½-plate, £5

New Facile Developing Set, £2 2s.

Promptitude of despatch and careful attention given to all orders forwarded to

CENTRAL PHOTOGRAPHIC STORES,

146, CHARING CROSS ROAD, LONDON, W.

Wooler.

A—BRAND, High Street.

Worcester.

A—C. FERNELEY, 61, The Tything.
Information—Changing only. *Terms for Use*—Not stated. *Hours Open*—Not stated.

Worthing.

A—A. B. CORTIS, 30, South Street.
Information—Changing and developing. *Terms for Use*—Changing, 3d.; developing, 6d. per half-hour; 3s. 6d. week. *Hours Open*—10 a.m. to 5 p.m.

Wotton-under-Edge.

A—A. DURN, Church Street.
Information—Changing and developing. *Terms for Use*—Not stated. *Hours Open*—All day.

Yarm.

A—STRICKLAND & HOLT, chemists.
Information—Changing and developing. *Terms for Use*—Free. *Hours Open*—7 a.m. to 7 p.m. To 11 p.m. by arrangement.
A—HENRY BRADLEY.

Yarmouth.

A—EAST NORFOLK PRINTING Co., 29, Regent Street.
Information—Changing and developing. *Terms for Use*—6d. per day; 1s. 6d. week; 3s. month. *Hours Open*—9 a.m. to 7 p.m.
A—SHERMAN, Regent's Road.
A—E. MILLER, 14, King Street.

York.

A—M. MIDGLEY, 51, Fossgate.
Information—Changing and developing. *Terms for Use*—Changing free; developing, nominal charge. *Hours Open*—All day.
A—A. YARDLEY, 99, Nunnery Lane.

Youghal.

A—THOMAS & Co., opticians.

INDEX TO SECTIONS I., II., III., IV., VII., VIII. & IX.

PAGE

ABBREVIATIONS of the Titles of Periodicals 114
Abney on Star Magnitudes 153
Absorption Spectrum and Color of Oxygen 70
Absorption and Sensitising Action 109
Absorption, Management of 67
Abuse of Power of Stops 44
A Carrier for Dark Slides 203
Accurate Registration of Dark Slide 41
Acids 77
Acid, Guiaretic 73
Action of Bromide on Metals 72
Action of Chloride on Metals 72
Action of Electric Sparks on Gelatino-Bromide Plates 76
Action of Light on Silver Chloride 75
Actinometers 68
Actinometry and Photometry 67
Actinometrical Observations, Extension of 165
Actinometry 68
Activity of Iodine in Solution 78
Activity of Light in Various Localities 68
Advance in Etched Typographic Blocks 175
Advances in Spectroscopy in 1891 159
Advertisements, Index to 868
Against the Sky 710
A Group of Children 716
Air Bubbles, Beware of 49
A Kentish Lane 711
Albumen Prints 96
Albumen Prints, Blisters on 97
Albumen Prints, Fading of 97
Albumen Prints, Mounting 57
Albumen Prints, Red Tones with 97
Albumen Prints, Reduction of 97
Albumen Prints, Toning of 97
Albumen Process for Lantern Slides 107
Albumen Process, Lumiere's Reversed 176
Algol, Spectrum of 141
Aluminium 82
Aluminium Bronze 82
Aluminium, Combustion of 71
Alizarin Blue as a Sensitiser 108
Alkalies 77
Alkaline Carbonates in Developers, Table Showing Comparative Value of 22
Allotropic Silver 110
American Developing Formulæ 90
American Measures 77
American Weights 77
Ammonia, Flame Spectrum of 70
Ammonium Bromide, Combination with Thiocarbamide 80
Andromeda Nebula, Photographs of 116
An Interested Sitter 715
Annals of Photography, The 65
Antidotes, Eisden's Tables of Poisons and 23
A Portable Dark Room, and how to make it 214

PAGE

A Portable Photographic Studio, and how to hold it 189
A Practical Chat upon Dark Rooms 209
A Record of Photo-mechanical Printing in 1891 174
Argus Nebula 120
Articles on Practical Subjects, Selected 185
Artificial Production of Optical Phenomena 163
Artistic Aspect of Photography in 1891 180
Astronomer Royal on Star Chart 125-127
" " on Sun Photographs 142
Asphalt ..... 72 & 77
Aspbalt, Increase of Sensitiveness ..... 72 & 77
Assign Places for Bottles on 45
A Summer Idyl 715
Authors, Index to 862
A Use for Smoke 208

BACK Combination of R.R. Lens, Use of 43
Back, Use of the Swing 42
Backing Plates with Caramel 50
Backs of Negatives, Cleaning the 52
Bad Light in East Wind 52
Bags, Wash-leather, Keeping Lenses in 40
Barnard, Photographs by 117
Before Going on Tour, Try your Plate 37
Benzene, Recognition of 78
Beware of Air-bubbles 49
Beware of Warp in the Printing-frame 53
Bigelow on Eclipse Photography 145
Bigelow on Meridian Photograph 133
Bigelow on Standardising Plates 146
Binding Lantern Slides 61
Bitumen (see Asphalt) ..... 72 & 77
Bitumen, Increasing the Sensitiveness of 174
Black Prints 103
Black Varnish 81
Blisters in Albumen Prints 97
Blue Prints 102
Blue Prints, To Tone 55
Borax in Eikonogen Developer 87
Bottle, Dropping, How to use a 46
Bottles, Glass Stoppered, Use of 44
Bottles, Labelling 44
Bottles on Shelves, Places for 45
Bottles, Taking Down and Pouring from 45
Braun on Prominence Photography 147
Broad Strap for Camera Case 37
Bromide Paper 84
Bromide Paper, Development of 100
Bromide Paper and Para-amido-phenol 101
Bromide Prints, Fading of 102
Bromide Prints, Toning of 101
Bromide of Silver, Blue Sensitive 74
Bromide of Silver, Modifications of 75
Bromide of Silver, Pure Films of 74
Bromides, Function in Development 85
Bromine Action on Metals 72
Bromine Substitution in Sunlight 73
Brush for Mounting, The 56
Brush, Use of, in Development 47

PAGE

Bubbles, Air, Beware of 49
Buckskin Bill 713
Building a Portable Studio 189
Burnbam, Photographs of Transit of Mercury by 156
Burton's Table of Comparative Exposures 12

CADMIUM Bromide as Intensifier ... 95
Calculations, Acland's Table for the Simplification of Emulsion 14
Camera Case, Broad Strap for 37
Camera Case, Packing the 37
Candles, Standard 68
Cap to the Lens, Secure the 41
Cape, Photographic Catalogue of Stars... 129
Caps for each Lens, Have two 40
Caramel, to make 50
Caramel, Backing Plates with 50
Carbonates in Developers, Alkaline, Table showing comparative value of... 22
Carbon Process 105
Care of Lenses 40
Carrier for Dark Slides 203
Case, Camera, Broad Strap for 37
Case, Camera, Packing the 37
Catechol, Development with 86
Celluloid Films, Utilisation of old 82
Cellulose, Solvent for 79
Changes in Nebula 120
Chart, Distribution of Tone of 127
Chart, International Photographic ...123-129
Chart, Progress of Work 121
Chat upon Dark Rooms, A Practical 209
Cheap Chloride of Gold 54
Chemical Constitution and Developers 85
Chemicals used in Photography, Table of Symbols, Molecular Weights and Solubilities of the Principal 26
Chemicals, Photographic, Impurities in and Tests for 24
Chemistry, Photographic, Progress in during 1891 67
Chloride of Gold, Cheap 54
Chloride of Silver, Action of Light on ... 75
Chlorides used in Photography, Table of equivalent quantities of 21
Chlorine, Action on Metal 72
Chlorocyanin as a Sensitiser 108
Chlorophyll 72
Choice of a Mount 56
Cleaning the Backs of Negatives 52
Clearing Lantern Slides 60
Cloth, Secure the Focussing 41
Cloud Negatives, Intensifying 162
Cloud Photographs 162
Clouds, Printing in Lantern Slides 59
Clusters of Stars, Photographs of 129
Coeruleln as a Sensitiser 108
Colloidal Silver 110
Collodion Emulsion 83
Collodion Emulsion, Orthochromatic ... 83
Collodion Plates, Orthochromatic Dry... 111
Collodio-bromide Emulsion, To Make ... 61
Collodio-chloride Emulsion 84
Collodio-chloride Prints 97
Collodio-chloride Prints, Fading of 97
Collotype Printing, Warnerke on 178
Colour of Negatives, Value of, Determined by Spectrum Analysis 160
Coloured Varnish 81
Colours, Photography in 111
Combination, Use of Back of R.R. Lens 43
Combustion of Aluminium 71
Comets, Photographs of 157
Common, Dr., Moon Photographs by ... 152
Common, Dr., Photographs of Nebulæ by 115

PAGE

Common, Dr., Photographs of Orion by 117
Common, Dr., Photographs of Jupiter by 155
Comparative Exposures, Burton's Table of 12
Comparison of the Readings of Thermometers, Table Showing 13
Comparative Value of Alkaline Carbonates in Developers, Table of 22
Compose Picture on Finder 51
Contributors to *Photography* Annual 864
Convenlent Screw For, A 40
Conversion of French Weight into English Measure, Table of 20
Conversion of French Weight into English, Table of 20
Cool, Keep, When Taking Shots 51
Copying, Magnesium Ribbon for 55
Copying Line Subjects 107
Cover the Diaphragm Slot of your Lens 40
Cut Paper Lengthwise 53
Cutting Shapes 60
Cornu, Ultra-violet Spectra by 149
Crime and Photography 70
Crystallos 87
Cyanin 108
Cyanotype 104

DARK Rooms, a Practical Chat upon... 209
Dark Room, a Portable, and How to Make it 214
Dark Room, Temperature of the 48
Dark Room, Ventilation of the 48
Dark Slide, Accurate Registration of 41
Dark Slides, a Carrier for 203
Daylight, Sensitometry with 68
Deep Lead-lined Sink 48
Deslandres, Star Spectra by 141
Deslandres on Motion of Stars 141
Deslandres on Prominence Photography 148
Detective, Do not Make Hand camera a 51
Developers 85
Developers, Comparison of 85
Developers, Mixed 94
Developers, Reactions of 86
Developers, Table showing Comparative Value of Alkaline Carbonates in 22
Developing Gelatine Slides 59
Developing Power and Chemical Constitution 85
Development 85
Development, Exposure and Gradation 69
Development not to be Hurried 48
Development with Catechol 86
Development with Eikonogen ..... 46 & 87
Development, Use of a Brush in 47
Diaphragm Slot of your Lens, Cover the 40
Diaphragms, Waterhouse 41
Diapositives 106
Difficulties, the Tripod under 42
Directory to Dark Rooms 809
Directory to Dealers 760
Directory to Registered Telegraphic Addresses and Telephone Numbers 723
Directory to Registered Telegraphic Addresses, Arranged According to Telegraphic Cypher 731
Directory to the Photographic Trade 735
Displacement on Ground Glass of Objects in Motion, Table showing 9
Dissolve Salts Quickly, To 49
Do not Blame the Hand Camera for your own faults 52
Double Stars by Photography 133
Draper, Catalogue of Star Spectra by ... 135
Dropping Bottle, Use of a 46
Drying Agents 78
Dumb Bell Nebula, Photographs of 116

PAGE

EASHING Bridge 711
East Wind Means Bad Light..... 52
Eclipse Photography, Solar 144, 146
Eclipse Photography, Lunar..... 154
Eikonogen and Quinol 47
Eikonogen, Development with 46-87
Eisden's Table of Poisons and Antidotes 23
Electric Currents in Development..... 112
Electricity, Photo 112
Electric Lamp 72
Electric Sparks, Action of, on Gelatino-bromide Plates 76
Electrotyping from the Gelatine Plates.. 175
Eliminating Grain in Spectra Enlargements, Higgs's Method of 160
Emulsifying Apparatus 83
Emulsions 83
Emulsion Calculations, Ackland's Tables for the Simplification of 14
Emulsion, Collodio-bromide, To Make .. 61
English Measure, Conversion of French into, Table of 20
English Weight, Conversion of French into, Table of 20
Enlargement and Reduction, Table for... 16
Enlargements 107
Enlargements of Star Spectra..... 159
Enlargements on Platinotype 107
Equations Relating to Foci 10
Equivalent Quantities of some Chlorides used in Photography, Table of..... 21
Espin on Milky Way Photographs..... 123
Estimation of Silver..... 79
Etched Typographic Blocks, Advance in 175
Evershed on Prominence Photography 148
Exposing Lantern Plates 58
Exposure and Intensity 69
Exposure, Development and Gradation 69
Exposures for Star Chart 126
Exsiccators 78
Extension of Actinometrical Observations 165
Eyepieces for Focussing..... 172

FABRICS, Photographs on 100
Fargis on Time by Photography ... 133
Feer-type 102
Ferrous Oxalate, Preparation of..... 94
Field, Tips in the 40
Films 82
Films, Preparation of 82
Finder, Compose your Picture on the ... 52
Finder, Follow Moving Objects on the . 51
Finder, Hood for the 51
Finders, Large 50
Fingers, Protection from Developers..... 86
Fixed Stoppers, To Remove..... 44
Fixing 94
Flame Spectrum of Ammonia 70
Flash Powders 71
Flash Powders, Rate of Combustion of... 71
Flat Negative, To Print from a 53
Flower Studies 196
Fluoride, Silver..... 79
Fluorspar in Optical Instruments 70
Foci, Equations relating to 10
Focussing Cloth, Secure the 41
Focussing Eyepieces 172
Focussing Methods 171
Focussing Screen, Substitutes for a Ground Glass..... 43
Focussing Screen, Verticality of..... 43
Follow Moving Objects on the Finder ... 51
Formation of Quinhydrones..... 73
Formulæ, Weights and Measures 77
Frame, Printing, Warp in the 53
French Measures, Conversion into English, Table of 20

PAGE

French Weight, Conversion into English, Table of 20
Front, Use of the Rising..... 42

GAS Lighting, Incandescent..... 72
Gelatino-chloride Emulsions..... 83
Gelatino-citro-chloride Emulsions 83
Gelatine, Pits and Hollows in 83
Gelatine Plate, Electrotyping from the... 175
Gelatine Slides, Developing..... 59
Gelatino-bromide Plates, Action of Electric Sparks on 76
Gelatino-chloride Emulsion with Resin 85
Gelatino-chloride Prints..... 98
Gill, Dr., on Motion of Stars..... 140
Gill, Dr., on Photography of Minor Planets 156
Gill, Dr., on Photographs of Jupiter 156
Glass Stoppered Bottles..... 44
Gold, Cheap Chloride of..... 54
Gold Powders..... 82
Gold, Removal from Solutions..... 78
Gore, J. E., on Star Spectra 135
Gradation, Exposure, and Development 69
Graining an Ordinary Negative, Amman's Method 177
Grain in Spectrum Enlargements, Higgs's Method of Elimination 160
Green Fog, Removal of 95
Ground Glass Focussing Screen, Substitutes for 43
Ground Glass Screen, Oiling 40
Ground Glass, Table Showing Displacement of Objects in Motion on 9
Gum Arabic..... 82

HALATION, Prevention of 118
Hale, Prof. G. E., on Prominence Photography 146
Hand Camera not a Detective 51
Hand Cameras should be Light-tight ... 50
Hand Camera Tips 50
Hand Cameras to be Held Level 51
Hand Camera Work, Speed of Shutter for 51
Hard Negative, To Print from a 53
Harvard College Photographic Catalogue of Stars..... 130
Henry Brothers on Photographic Refraction 134
Henry Brothers, Moon Photographs by 152
Henry Brothers, Jupiter Photographs by 155
Heliochromy 111
Higgs, G., on Solar Spectrum 150
Holden, Prof., on Orion Nebula 117
Holden, Prof., on Photography of Planets 133
Holden, Prof., on Moon Photographs 151-152
Holden, Prof., on Photographs of Jupiter 154
Hold Hand Cameras Level..... 51
Hood for Finders 51
How to Build a Portable Photographic Studio 189
How to Make a Portable Dark Room ... 214
Hurry, Do not, in Development 48
Hydrogen, Reduction of Silver Salts by 76
Hypo not to be touched whilst Toning Prints..... 54
Hypo in Saturated Solution 49
Hydroquinone (See Quinol).

IFFLEY Mill on the Thames 711
Illumination..... 71
Impurities in Photographic Chemicals, and Tests for Them 24
Incandescent Gas Lighting 71-72
Increasing the Sensitiveness of Bitumen 174
Information of Use to and Concerning the Trade 709

PAGE

Index to Advertisements 868
Index to Authors Quoted in Section III. 864
Index to Sections I., II., III., IV., VII., VIII., and IX. 844
Index to Sections V. and VI. 853
Index to Sections V. and VI., Arranged According to Firms 858
Ink, White, To Make 60
Ink, White, for Prints 78
Instruments for Meteorological Photography 163
Intaglio Plates. Reproducing Old 177
Intensity and Exposure 69
Intensification of Cloud Negatives 162
Intensification 94
International Chart of Stars 123-129
International Chart, Distribution of Tones for 127
International Chart, Progress of Work ... 128
Invention in Optical Lanterns, Modern 195
Iodine, Activity in Solution 78
Iodine in Quinol Developer 93
Iron Printing Processes 102
Isochromatic Photography (See Orthochromatic Photography).

JACOBY, H., on Photographic Refraction 134
Jaffé's Method of Reproducing Old Intaglio Plates 177
Janssen, Sun Photographs by 143
Janssen on the Oxygen Spectrum 149
Jupiter, Photographs of 154-156

KALLITYPE 103
Keep Cool when taking Shots 51
Keeping Quantities of Plates 83
Keep Sensitized Paper, To 53
Keep your Hypo in Saturated Solution ... 49
Kinocyanine, Development with 88
Klein, Dr., on Moon Photographs 157

LABELLING Bottles 44
Lanternists' Ready Reference Table 15
Lantern Matters, Tips on 58
Lanterns, Optical 172
Lantern, Optical, and its Modern Inventions 195
Lantern Plates, Exposing 58
Lantern Slides 106
Lantern Slides, Binding 61
Lantern Slides, Clearing 60
Lantern Slides, Colouring of 107
Lantern Slides, Drawing of 107
Lantern Slides, Marking 60
Lantern Slides, Printing Clouds in 59
Lantern Slides, To Make 58
Large Finders 50
Latitude by Photography 133
Lead-lined Sink, Deep 48
Lead Salts, Printing with 99
Legs, Tripods with Sliding 40
Lens, Cover the Diaphragm Slot of your 40
Lens, Have Two Caps for each 41
Lenses in Wash Leather Bags, Keeping 40
Lens Mounts, &c. 168
Lenses, Points worthy of notice about 38
Lenses, Practical and Simple Tests as applied to Photographic 206
Lens, Secure the Cap to the 41
Lens Standards 170
Lenses, Take Great Care of 40
Lenses, Testing 169
Lenses, Use of 171
Lens, Use of Back Combination of R.R. 43
Level, Hand Cameras to be Held 51
Lick Observatory, Photographs of Nebulæ at ..... 117 & 118

PAGE

Lick Observatory, Photographs of Clusters at 121
Lick Observatory, Photographs of Moon at ..... 150 & 152
Lick Observatory, Photographs of Planets at ..... 154 & 155
Lick Observatory, Photographs of Transit of Mercury 156
Light. Activity of, in Various Localities 68
Light Bad in East Wind 52
Lightning Photographs 162
Light Passing Through Sea-water 67
Light-tight, Hand Cameras to be 50
Lime in the Pyro Developer 90
Line Engravings, Copying of 107
Lithium Compounds in Developers 90
Lockyer, Nebulæ Spectra by 142
Longitude by Photography 133
Lumière's Reversed Albumen Process ... 176
Luminous Paints 82
Lunar Photography 150-154
Lyra, Ring Nebula in 118
Lyræ β, Spectrum of 137

MAGNESIUM Chloride as Fixing Agent 95
Magnesium Flash Powders 71
Magnesium in Oxygen 72
Magnesium Ribbon for Copying 55
Magnitude of Stars by Photography 120, 125, 135, 153
Magpie Negatives 198
Making Starch for Mounting Purposes ... 56
Management of the Tripod under Difficulties 41
Maunder on Parallax of Stars 131
Maunder on Solar Photography 143
Marking Lantern Slides 60
Marking of Plates 49
Masks, Surface Paper for 60
Materials, Photographic 77
Matt Varnish 81
McClean, F., Spectrum of Sun 149
Measure, Conversion of French into English 20
Measurement of Absorption 67
Measures, American 77
Measures, Weights and Formulæ 77
Measures and Weights, Metric System 18
Medmenham Abbey 711
Mercury, Photographs of Transit of 156
Mercury Vapour, Action on Gelatine Plates 85
Metals, Action of Chlorine and Bromine on 72
Meteorites, Photographs of 157
Meteorological Observations, Reproduction of Ancient 165
Meteorological Photographs, Collection of 162
Meteorological Photography 70
Meteorological Photography, Instruments for 163
Meteorological Progress in 1891 162
Methods of Focussing 171
Metric System of Weights and Measures 18
Mignon Paper 39
Milky Way, Photographs of (by Wolf) 119, 123
Milky Way, Photographs of (by Russell) 122
Milky Way, Photographs of (by Espin) ..... 123 and 132
Milky Way, Dark Patches in 122, 123
Milky Way, Variable Stars in 123
Milky Way, Photographs of (by Rosse) 132
Milky Way, Gore on Photographs of ... 135
Minor Planet Discovered by Photography 156
Miss Mischief 713
Mix Your Own Solutions 45

PAGE
Modern Inventions in Optical Lanterns 195
Molecular Weights, Symbols and Solubilities of Principal Chemicals used in Photography, Table of 26
Molesworth on Moon Photographs 153
Moon, Photographs of 150, 154
Mouchez, Admiral, on Star Chart 128
Mountants other than Starch 56
Mounting Albumen Prints 57
Mounting Brush, The 56
Mounting, Starch for 56
Mounting Tips 56
Mounts, Choice of 56
Mounts, Lens 168
Moving Objects, Follow on the Finder ... 51
Mucilages 78
My New Pinafore 713

NEBULAR Photography 115-121
Nebula, Variable 116
Nebulæ in Argus 120
Nebulæ, Changes in 120
Nebulæ, Spectra of 142
Negative, Graining a 177
Negative, To Print from a Flat 53
Negative, To Print from a Hard 53
Negative, To remove Varnish from 54
Negatives, Backs of, to be cleaned 52
Negatives, Intensification of Cloud 162
Negatives, Magpie 198
Negatives, Reproduced 106
Neilson, V., Photographs of Stars by 121
Neilson, V., Photographs of Comet by ... 157
Neptune, Photographs of 156
Nordfjord ved Vasenden i Loen 715
Notes on Outdoor Work 187

OBJECTIVES, Photographic 166
Objects in Motion, Table showing Displacement on Ground Glass of 9
Observations, Actinometrical 165
Oiling Ground Glass Screen 40
Old Celluloid Films, Utilisation of 82
Omega Nebula, Photographs of 116
Optical Instruments, Fluorspar in 70
Optical Lantern, The 172
Optical Lantern and its Modern Inventions, The 195
Optical Phenomena, Artificial production of 163
Optics, Photographic, in 1891 166
Organic Compounds and Sunlight 73
Orion Nebula, Photographs of 115-117
Orion Nebula, Spectrum of 142
Orthochromatic Collodion Emulsion 83 & 109
Orthochromatic Dry Collodion Plates ... 111
Orthochromatic Photography 107
Orthochromatic Photography, History of 107
Orthochromatic Plates for Nebulæ 116
Orthochromatic Plates for Eclipse Photography 145
Our Illustrations 709
Over-exposure, Remedying 47
Oxygen, Absorption, Spectrum, and Colour 70
Oxygen, Magnesium In 72

PACKING the Camera Case 37
Packing Paper, Testing of 79
Paints, Luminous 82
Paper, Plain, Silver Printing on 205
Paper, Sensitised, To Keep 53
Paper, Testing 79
Paper, To be Cut Lengthwise 53
Paper, Wood Pulp in 82
Parallax of Stars ..... 130 & 131
Parallax of Stars, Pritchard on ..... 130 & 131
Parallax of Stars, Maunder on 131
Paramidophenol and Bromide Paper 101

PAG
Paramidophenol, Development with 89
Paramidophenol, Properties of 88
Paste 78
Pendulum, Seconds 42
Pinhole Photography 70
Periodicals, Abbreviations of Titles of ... 114
Photo-anethoil 73
Photo-electricity 112
Photography, Artistic, in 1891 180
Photographic Chemicals, Impurities in and Tests for 24
Photographic Chemistry, Progress in, during 1891 67
"Photography"—Illustration 714
Photographic Instruments for Meteorology 163
Photographic Lenses, Tests for 206
Photographic Materials, &c. 77
Photograph of a Meteorite 712
Photograph of the Milky Way in the region of *a* Cygni 712
Photograph of the Milky Way in the region of *β* Cygni 712
Photographic Optics in 1891 166
Photographic Objectives 166
Photographic Societies of the United Kingdom 601
Photographic Studio, Portable 189
Photographic Trade Marks 665
Photographing Clouds 162
Photographing Invisible Prominences ... 148
Photographs, Meteorological, Collection of 162
Photographs of Lightning Flashes 163
Photography and Crime 70
Photography in Colours 111
Photography, Meteorological 70
Photography, Pinhole 70
Photography, Table of Symbols, Molecular Weights and Solubilities of the Principal Chemicals used in 26
Photography, The Annals of 77
Photolytic Action 77
Photo-mechanical Printing in 1891, A Record of 174
Photometry and Actinometry 67
Pickering, Professor, Astronomical Photographs at Harvard ..... 120 & 130
Pickering, Professor, on Star Magnitudes ..... 133 & 135
Pickering, Professor, on Star Spectra ... 134
Pickering, Professor W. H., on Moon Photographs 152
Picture on the Finder, Compose your ... 52
Pits and Hollows in Gelatine Emulsions 83
Places for Bottles on Shelves 45
Plain Paper, Silver Printing on 205
Planets, Daylight Photographs of 133
Planets, Photographs of 154-157
Planets, Minor, Discovered by Photography 156
Plates, Backing with Caramel 50
Plates, Keeping Properties of 83
Plates, Lantern, Exposing 58
Plates, Marking of 49
Platinotype 103
Platinotypes, Brown 103
Platinotype, Cold Bath 103
Platinotype, Use of Old Paper 103
Platinum Printing, Direct 99
Platinum, To Tone with 54
Pleiades, Photographs of ... 116, 117, 118 & 125
Plummer, on Star Chart 125
Poisons and Antidotes, Elsden's Table of 23
Points about Lenses worthy of note 38
Pope, The, on Star Chart 132
Portable Dark Room, and How to Make It 214

PAGE

Portable Photographic Studio, and How to Build It ... 139
Positive Processes ... 96
Pouring from Bottles ... 45
Powders, Gold and Silver ... 82
Power of Stops, Abuse of ... 44
Practical Chat upon Dark Rooms ... 209
Practical and Simple Tests as applied to Photographic Lenses ... 206
Practical Subjects, Selected Articles on ... 185
Preparation of Films ... 82
Primuline Heat Discharge Process ... 177
Primuline Process ... 105
Princess May ... 716
Print from a Flat Negative, To ... 53
Print from a Hard Negative, To ... 53
Printing and Toning Tips ... 52
Printing, Collotype, Warnerke on ... 178
Printing Clouds in Lantern Slides ... 59
Printing on Plain Paper ... 205
Printing, Photomechanical, in 1891 ... 174
Printing Processes ... 96
Print-out Processes ... 96
Prints, Albumen, Mounting ... 57
Prints, To Tone Blue ... 55
Prints, To Wash, Rapidly ... 49
Print, Trimming, to Suit Subject ... 57
Prints, Unmounted, Showing ... 57
Pritchard, Prof. C., Photographs by ... 117
Pritchard, Prof C., on Star Chart ... 126
Pritchard, Prof. C., on Parallax of Stars 130 & 131
Progress in Meteorology in 1891 ... 162
Progress of Astronomical Photography in 1891 ... 115-157
Progress in Photographic Chemistry during 1891 ... 67
Progress in Spectrum Work ... 70
Prominence Photography by Hale ... 146-147
Prominence Photography by Braun ... 147
Prominence Photography by Deslandres ... 148
Prominence Photography by Evershed ... 148
Protection of Fingers from Developers ... 86
Pure Films of Silver Bromide ... 73
Purity of Sulpho-cyanides ... 80
Pyrocatechin (See Catechol)
Pyrogallic Acid (See Pyrogallol)
Pyrogallol, Development with ... 90
Pyrogallol, Intensification with ... 95

QUAIACOL, Test for ... 78
Quaiaretic Acid ... 73
Quickly Dissolve Salts, To ... 49
Quinhydrones, Formation of ... 73
Quinol, Action of Sulphuric Acid on ... 79
Quinol, Development with ... 90
Quinol, Sulphuric Acid ... 79
Quinol and Eikonogen ... 47

R.R. LENS, Use of Back Combination of ... 43
Rapid Washing of Prints ... 49
Rate of Combustion of Flash Powders ... 71
Reaction of Developers ... 86
Readings of Thermometers, Table Showing Comparison of ... 13
Ready Reference Table for Lanternists ... 15
Recognition of Benzine ... 78
Record of Photo-mechanical Printing in 1891 ... 174
Reckoning it out ... 714
Red, Sensitisers for ... 108
Reduction ... 94
Reduction and Enlargement, Tables of ... 16
Reduction by Hydrogen of Silver Salts ... 76
Reference Table for Lanternists, Ready ... 15
Registration of Dark Slide, Accurate ... 41
Remedying Over-exposure ... 47

PAGE

Remedying Under-exposure ... 47
Removal of Gold from Solutions ... 78
Remove Varnish from a Negative, To ... 54
Removing Fixed Stoppers ... 44
Reproduced Negatives ... 106
Reproducing Old Intaglio Plates ... 177
Reproduction of Ancient Meteorological Observations ... 165
Reseaux, Use in Star Chart of ... 124
Residues ... 79
Resin in Gelatino-chloride Emulsion ... 85
Resinised Paper, Prints on ... 99
Resorcinol in Quinol Developer ... 94
Retouching, True ... 200
Retouching Varnish ... 81
Reversal of Image ... 95
Reversed Alhumen Process, Lumière's ... 176
Reversed Positives ... 96
Rhodamine as a Sensitiser ... 108
Rising Front, Use of the ... 42
Roberts, Nebula Photographs by ... 116
Roberts, Star Clusters Photographed by ... 121
Roberts, Photographs of Neptune ... 146
Rodinal ... 94
Roller Squeegee, Use of ... 57
Rose Tap, Use of the ... 48
Rowland's Solar Spectroscopy ... 149
Ruled Screens ... 178
Russell, Photographs at Sydney by ... 120, 122
Russell, Photographs of Milky Way ... 122
Rutherford, Astronomical Photographs by 132

SALTS, To Dissolve, Quickly ... 49
Sample of International Photographic Chart of the Stars ... 711
Sapanin ... 94
Saturated Solution, Hypo in ... 49
Scheiner, Dr., on Star Magnitudes, 125 & 126
Scheiner, Dr., on Binary Stars ... 139
Scheiner, Dr., on Star Spectra ... 139
Screen, Ground Glass, Oiling ... 40
Screen, Substitutes for a Ground Glass Focussing ... 43
Screen, Verticality of Focussing ... 43
Screens ... 72
Screens, Ruled ... 178
Screens, Yellow ... 109
Screw for the Tripod, Have a Spare ... 41
Screw for the Tripod Head, A Convenient ... 40
Sea Water, Light Passing Through ... 67
Seconds Pendulum ... 42
Secure the Cap to the Lens ... 41
Secure the Focussing Cloth ... 41
Selected Articles on Practical Subjects 185
Sensitisers ... 108
Sensitisers for Red ... 108
Sensitised Paper, To Keep ... 53
Sensitising Action and Absorption ... 110
Sensitiveness of Bitumen, Increasing the 174
Sensitometers ... 68
Sensitometry with Daylight ... 68
Sepia Prints on Bromide Paper ... 101
Shapes, Cutting ... 60
Shelves, Places for Bottles on ... 45
Shots, Keep Cool when Taking ... 51
Showing Unmounted Prints ... 57
Shutter, Speed of, for Hand Camera Work ... 51
Sidereal Spectroscopy ... 134, 147
Silver, Allotropic ... 110
Silver Bromide, Blue Sensitive ... 74
Silver Bromide, Modifications of ... 75
Silver Bromide, Pure Films of ... 74
Silver Chloride, Action of Light on ... 75
Silver Colloidal ... 110
Silver, Estimation of ... 79
Silver Fluoride ... 79

PAGE

Silver Paper, Matt Surface 99
Silver Powders 82
Silk, Prints on 100
Silver Printing on Plain Paper 205
Silver Salts, Reduction by Hydrogen ... 76
Silver Soluble 110
Silver, Sub-chloride 75
Simple Apparatus for Spectrum Analysis 161
Simplification of Emulsion Calculations, Ackland's Table for the 14
Sink, Deep Lead-lined 48
Slides, Gelatine, Developing 59
Slides, Lantern, To Make 58
Slides, Lantern, Binding 61
Slides, Lantern, Clearing 60
Slides, Lantern, Marking 60
Slides, Lantern, Printing Clouds in 59
Slides, Toning 59
Sliding Legs, Tripods with 40
Studio, How to Build a Portable 189
Smoke, A Use for 208
Smoked Glass Spectacles, Use of 54
Smyth, Prof. P., on Solar Spectroscopy 149
Sobrerol 78
Societies, Photographic, of the United Kingdom 601
Solar Photography 142-144
Solar Spectroscopy 146 150
Solar Spectroscopy by Rowlands 149
Solar Spectroscopy by McClean 149
Solubilities, Symbols and Molecular Weights of the Principal Chemicals used in Photography, Table of 26
Solution, Saturated, Hypo in 49
Solutions, Mix your own 45
Some Notes on Outdoor Work 187
South Kensington, Solar Spectroscopy at 150
South Kensington, Spectra of Stars at... 138
Spare Screw for the Tripod 41
Special Subjects, Take Two Shots at ... 52
Spectacles of Smoked Glass, Use of 54
Spectra, Star 159
Spectra of Stars 134-142
Spectra of Stars, Draper Catalogue of 135-138
Spectra of Stars, Harvard College 138
Spectra of Stars, Scheiner on 139
Spectroscopy 70
Spectroscopy, Advances in 1891 159
Spectroscopy, Solar 146 150
Spectroscopy Sidereal 134-142
Spectrum Analysis, Simple Apparatus for 161
Spectrum Analysis determining the value of Colour of Negatives 160
Spectrum (Absorption) and Colour of Oxygen 70
Spectrum Work, Progress in 70
Speed of Shutter for Hand Camera Work 51
Squeegee, Use of Roller 57
Standards, Lens 170
Star Spectra 159
Star Spectra, Enlargements of 159
Star Clusters, Photographs of 121
Stars, Cape Catalogue 149
Stars, International Chart of 123, 129
Stars, International Chart, Distribution of Zones in 127
Stars, International Chart, Progress of Work at 128
Stars, Parallax of 130
Stars, Parallax of, Maunder on 131
Stars, Parallax of, Pritchard on 130, 131
Stars, Double Photographs of 133
Stars, Binary ..... 136 & 137
Stars, Motion of ..... 140 & 141
Stars, Magnitudes of ... 120, 125, 133, 135 & 153
Starch for Mounting Purposes 56
Stops, Abuse of Power of 44

PAGE

Stops, Uniform System Numbers of 11
Stoppers, To Remove Fixed 44
Stoppered Bottles, Use of Glass 44
Straps for Camera Case, Broad 37
Studies, Flower 196
Subjects, Take Two Shots at Special ... 52
Substitutes for a Ground Glass Focussing Screen 43
Sulphocyanides, Purity of 80
Sun, Photographs of 142-144
Sun, Spots on 143
Sunlight and Organic Compounds 73
Supports 82
Surface Paper for Masks 60
Swing Back, Use of the 42
Symbols, Molecular Weights and Solubilities of Principal Chemicals used in Photography, Table of 26
System of Weights and Measures, Metric 18
System, Uniform, of Stop Numbers 11

TABLE for Lanternists, Ready Reference 15
Table for the Simplification of Emulsion Calculations, Ackland's 14
Table of Comparative Exposures, Burton's 12
Table of Conversion of French into English Weight 20
Table of Conversion of French into English Measure 20
Tables of Enlargement and Reduction... 16
Table of Equivalent Quantities of some Chlorides used in Photography 21
Table of Impurities in Photographic Chemicals and Tests for them 24
Table of Poisons and Antidotes, Eisden's Table of 23
Table of Symbols, Molecular Weights and Solubilities of the principal Chemicals used in Photography 26
Table showing comparative value of Alkaline Carbonates in Developers ... 22
Tables showing Displacement on Ground Glass of Objects in Motion 9
Table showing the comparison of the Readings of Thermometers 13
Take Great Care of your Lenses 40
Take Two Shots at Special Subjects ... 52
Taking Down Bottles 45
Taking Shots, Keep Cool When 51
Tap, Use of a Rose on 48
Temperature of the Dark Room 48
Testing Lenses 169
Tests for Impurities in Photographic Chemicals, Table of 24
Tests, Practical and Simple as applied to Photographic Lenses 206
The Optical Lantern and its Modern Inventions 195
Thermometers, Table showing the comparative Readings of 13
The Silver Strand, Loch Katrine 711
Thiocarbamide, Combination with Ammonium Bromide 80
Time by Photography 133
Tips for Mounting 56
Tips for Touring Tyros, Preparatory... 37
Tips for Tyros 37
Tips, Hand Camera 50
Tips in the Field 40
Tips on Lantern Matters 58
Tips on Printing, Toning, &c. 52
To Bind Lantern Slides 61
To Make a Collodio-bromide Emulsion.. 61
To Make Caramel 50
To Make Lantern Slides 58
To Make Starch for Mounting Purposes 56

PAGE
To Make White Ink ... 60
Tone all Prints before Touching Hypo ... 54
Toning and Printing Tips ... 52
Toning Blue Prints ... 55
Toning, Chemistry of ... 101
Touring Tyros, Preparatory Tips for ... 37
Toning Slides ... 59
Toning with Platinum ... 54
To Remove Fixed Stoppers ... 44
To Remove Varnish from a Negative ... 54
To Tone Blue Prints ... 55
To Tone with Platinum ... 54
Trade, Information of Use to and Concerning the ... 709
Trade Marks, Photographic ... 665
Transparencies ... 84 & 106
Trimming Prints to Suit Subjects ... 57
Tripod Head, a Convenient Screw for ... 40
Tripod, Have a Spare Screw for the ... 41
Tripod, Management of, under Difficulties ... 41
Tripods with Sliding Legs ... 40
True Retouching ... 200
Try your Plate before going on Tour ... 37
Turpentine, Composition of ... 76 & 80
Turpentine in Hydroquinone Developer 118
Turpentine in Quinol Developer ... 93
Turpentine, Photo-oxidation of ... 76 & 80
Typographic Blocks, Advance in Etched 175
Typographic Glass Method, Winterboff's 177
Tyros, Preparatory Tips for Touring ... 37
Tyros, Tips for ... 37

UNIFORM System Numbers for Stops 11
Unmounted Prints, Showing ... 57
Uranium Prints ... 105
Uranium Toning Bath ... 101
Use for Smoke ... 208
Use of a Brush in Development ... 47
Use of a Dropping Bottle ... 46
Use of Back Combination of R.R. Lens 43
Use of Glass Stoppered Bottles ... 44
Use of Lenses ... 171
Use of Magnesium Ribbon ...
Use of Roller Squeegee ... 57
Use of Smoked Glass Spectacles ... 54
Use of the Rising Front ... 42
Use of the Rose Tap ... 48
Use of the Swing Back ... 42
Utilisation of Old Celluloid Films ... 82

PAGE
VARIABLE Nebula ... 116
Variable Stars in Andromeda ... 116
Variable Stars in Milky Way ... 123
Variable Stars by Photography ... 136-138
Varnish, Black ... 81
Varnish, Coloured ... 81
Varnishes ... 80
Varnish, Matt ... 80
Varnish, Retouching ... 81
Varnish, To Remove from ... 54
Ventilation of the Dark Room ... 48
Verticality of Focussing Screen ... 43
Vogel, Dr., on Star Spectra ... 139
Vogel, Dr., on Binary Stars ... 139, 141
Vogel, Dr., on Motion of Stars ... 140

WAITING for the Tide ... 715
Warnerke on Collotype Printing ... 178
Warp in the Printing Frame, Beware of 53
Washing of Prints, Rapid ... 49
Washleather Bags, Keeping Lenses in ... 40
Waterhouse Diaphragms ... 41
Weights, American ... 77
Weights and Measures, Metric System of 18
Weight, Conversion of French into English, Table of ... 20
Weights, Measures, and Formulæ ... 77
Weinck, Prof., on Moon Photographs 151-152
White Ink for Albumen Prints ... 78
White Ink, To Make ... 60
Williams, A. Stanley, on Lick Photographs of Jupiter ... 154-155
Winterhoff's Typographic Glass Method 177
Wolf, Dr. Max Nebula Photography ... 118
Wolf, Dr. Max, Milky Way, Photography by ... 119-123
Wolf, Dr. Max, on Star Magnitudes ... 125
Wolf, Dr. Max, Discovery of Minor Planet by ... 156
Wolf, Dr. Max, Photographs of Comet 157
Wolf, Dr. Max, Photographs of Meteorite 157
Wood Pulp in Paper ... 82
Work, Outdoor, Some Notes on ... 187

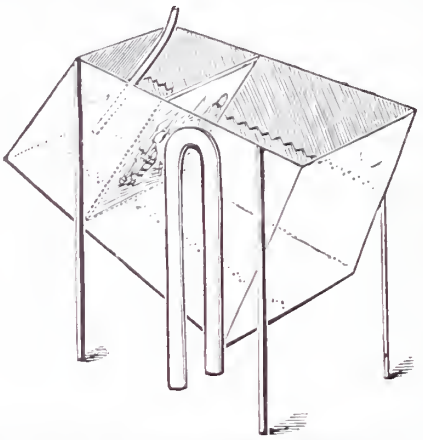
YELLOW Screens ... 109
Young on Star Spectra ... 142

ZINC Etching Experiences ... 105



JUST COMPLETED.

Smith's Patent Plate Washer



ADVANTAGES.

Automatically fills and COMPLETELY empties itself.
Washes away all deposit each time the large syphon acts. Never rucks the Films.
Completely removes the last trace of Hypo in half the usual time.

PRICES (including movable racks).

To wash 24 lantern or ¼ plates	... ...	**12/6**
,, 12 ½ plates	... ...	**12/6**
,, 12 1/1 plates	... ...	**14/-**

Prospectus and prices of larger sizes on application.

OF ALL DEALERS, AND
SMITH & SON, 102, PARADE, LEAMINGTON.

INDEX TO SECTION V. AND VI.

PHOTOGRAPHIC APPARATUS AND MATERIALS, LANTERNS, ACCESSORIES, AND SLIDES.

ACTINOMETERS, &c.

		PAGE
Actinograph, &c.	Marion	395
Combined	Stanley	396
Dibden's Exp. Table	Adden.	
Watkins Meter	Field	394

ALBUMS, STANDS, &c.

Aptus Scrap Album	Sharp	501
Autocrat Self-binder	Martin	501
Display Stand	McGhie	499
Facilus Photo. Clip	Ward	Adden.
Multiple Holder	Tylar	498
Orderly Folio	Weare	498
Photographer's File		501
Professional Album	Lund	499
Reception Room Album	Marion	500
Snap Shot Album	Lund	498
Snap Shot Album	Morley	501
Table Album	McGhie	501

BACKGROUNDS.

Grad Woollen	Schölzig	399
Washable	Sharp	400
Woollen	Sharp	400

BOOKS (TRADE).

Bromide Paper	Lund	519
Exposure Note Book	Mawson	520
Ilford Manual	Britannia W'ks	518
Lantern Slides	Fry	580
Microscopic Objects	Tylar	520
Photo Enlargements	Wheeler	520
Photographic Literature	Lund	518
Principles of a Lens	Beck	518
Wet Collodion Process	Mawson	520

BORDER AND OTHER NEGATIVES.

Border	Adams	487
Cloud (Carbon)	Green	483

BURNISHERS.

A. I.	Tylar	492
A. J.	Fallowfield / Marion	491
Hunter's	Hunter	493
Northern	Lonsdale	492

CAMERA FITTINGS.

Camera Cases	Levi	368
Changing Box	Newman	Adden.
Focussing Cloth	Mawson	368
Focussing Screen	Fitch	368
Turntable	Lonsdale	368

CAMERA LEVELS AND PLUMMETS.

		PAGE
Aptus	Sharp	368
Common Sense	Tylar	369
Lothian	Baird	369
Universal	Tylar	369

CAMERAS.

Acme	Watson	307
Aerial	Whittingham	296
Airedale	Watkinson	291
Airedale in Parts	Watkinson	294
Aluminium Club	Adams	310
Aluminium Instanto	Lancaster	298
Amateur	Whittingham	301
Artist	Whittingham	308
Ashford's Improved	Ashford	284
Baron	L.&P. Optic Co.	285
Book	Braine	310
Collapsible	Pearson	295
Companion	Parker	300
Export	Braine	313
Holborn	Houghton	299
Holborn Special	Houghton	298
Holland	Loman	297
Honduras Exhibition	Sands, Hunter	289
Invicta W. A.	Noakes	283
King	L.&P. Optic Co.	282
Liver	Archer	293
London	Whittingham	301
Long Extension	London Stereo	303
Long Focus	Slater	283
Magnum	Stanley	305
Marion's New	Marion	284
Minim	Watkinson	294
Modern	Braine	313
Norden No. 2	Mitchell	309
Norden No. 3	Mitchell	309
Northern	Lonsdale	285
Pocket	Braine	308
Pocket Instanto	Lancaster	296
Perfect	Fallowfield	293
Popular	Watkinson	291
Rayment's Improved	P. S. & R.	289
Royal	Adams	290
Ruby	Thornton	302
Scorer's	Scorer	286
Serviceable	McGhie	312
Simplex	Morley	303
Speciality No. 2	Pearson	295
Star	Morley	306
Studio	Hurman	292
Tourist	Braine	311
Tylar's No. 2	Tylar	304
Universal	Braine	308
Vevers	Vevers	312
Viceroy	Braine	314
Victor	Adams	291

CAMERAS, HAND.

		PAGE
Adams	Adams	331
Alert	Mercer	320
Aptus Universal	Sharp	Adden.
Arcanum	Talbot & Eamer	352
Arist Twin	London Stereo	341
Beyer	Beyer	358
Bonanza	Mercer	323
Clifford	Lawrance	327
Clifford Gun	Lawrance	344
Climax	McGhie	348
Collapsible	Ross	355
Companion	Parker	326
Crocodile	Tylar	337
Crouch	Crouch	352
Cytox	Harris	363
Daylight Kodak	Eastman	Adden.
Delta	Marion	332
Dresser	Crouch	355
Excelsior	Rouch	322
Fallowfield	Fallowfield	353
Frena	London Stereo	338
Guinea	Ashford	318
Guinea Pocket	Shew	Adden
Hat	Adams	354
Ideal No 2	Adams	320
Kodak	Eastman	339
Lothian	Baird	352
Miall	Fallowfield	315
Minimus	P. S. & R.	329
Normal Simp'ex	Marion	334
Omnigraph	Lancaster	344
Otto	Adams	350
Perfect	Tylar	346
Popular	Birm. P. Co.	Adden.
Popular No. 0	King	343
Popular No. 1	King	342
Popular	King	352
Presto No. 1	Franks	324
Presto No. 2	Franks	324
Purse	Blackfriars	345
Radial	Marion	324
Reflex	Loman	349
Repeatograph	Shew	Adden.
Rising Front	Crouch	356
Roberts	Roberts	349
Roberts, 1892	Roberts	345
Rover	Lancaster	347
Shuttle	Houghton	312
Stereoscopic	Miller	335
Success	Sheffield Photo Co.	326
Swinden and Earp		329
Talmer	Talbot and Eamer	352
Tit-Bits	Tylar	337
Twin Perfect	Tylar	343
Two Guinea	Griffiths	349
Ubique	P. S. & R.	348
Universal	Brooker	330
Universal	Shew	Adden.
Vanneck	Watson	336
Vesta	Adams	350

CAMERAS, SPECIAL.

Anschutz	Blackfriars	358
Laboratory Photo-micro	Watson	363
Micro-photo	Tylar	361
Nlevsky Ferrotype	Fallowfield	361
Photomnibus	Wormald	357
Student Photo-micro	Watson	363
Van Hewick's	Watson	365

CARRIERS.

Cycle	Stretton	Adden.
Film	Edwards	Adden.
Film	Gotz	367
Film	London Stereo	367
McDougall	Tylar	367

CHANGING BAGS AND TENTS.

Changing Bag	Baker	450
Combined Bag and Cloth	Sheff. Photo	451
Dark Tent	Fallowfield	448
Eclipse	Beresford	Adden.
Pocket	Baker	452
Portable	Baker	449
Portable	Davenport	449
Portmanteau	Fallowfield	450
Sheppard	L. & P. Optic Co.	Adden.
Tent	Sheff. Photo	451

CHEMICALS.

Chemical Price List		444

DARK ROOM FITTINGS.

Antiphoton	Wormald	461
Challenge Sink	Adams	462
Chemical Bottle	Hinton	Adden.
Cistern	Baird	465
Club Scales	Adams	478
Club Sink	Adams	460
Hypo Jar	Adams	478
Light Filter	Hunter	461
Lothian Balance	Baird	479
Lothian Syphon	Baird	467
No. 1 Sink	Davenport	460
No. 2 Sink	Davenport	462
Rational Sink	Davenport	461
Tap Filter	Tylar	463

DARK ROOM LAMPS.

Aptus By-pass Burner	Sharp	474
Bottle	Hunter	469
Brass	Fallowfield	470
Candle	Birm. P. Co.	473
Candle	Fallowfield	468
Candle	Griffin	471
Combined	Birm. P. Co.	472
Diamond	Hunter	472
Electric	Harris	467
Gas	Tylar	476
Holiday		471
Lizars	Lizars	475
Lothian	Baird	471
Phœnix	Reynolds	469
Revolving	Birm. P. Co.	473
Rubralux	Lancaster	475
Self-lighting Jet	Tylar	474
Sheppard	L. & P. Optic Co.	Adden.
Square Folding		471
Tourist's Friend	Tylar	468

DARK ROOMS.

Army	Davenport	455
Army Junior	Davenport	456
Boudoir	Davenport	458
Combined Sink	Davenport	457
Conical	Davenport	459
Eveready	Davenport	453
Maison Noir	Overend	455
Zephyr	Davenport	457

DARK SLIDES.

Dividing Plates	Tylar	367
Film	Edwards	Adden.

		PAGE
Film	London Stereo	337
Film	Sands, Hunter	366
Film	Thomson	366
"Lothian" Film	Baird	367
Prices of Extra Slides		370
Single Metal	Tylar	366

DEVELOPERS, PREPARED.

Hardcastle's	Hardcastle	441
Hydrokinone	London Stereo	441
Pyro Soda	London Stereo	441
Rodinal		440
Snap Shots	Edwards	441

DEVELOPING APPARATUS.

Celluloid Trays	Gotz	477
Combined Dish	Vevers	478
Jones Lifter	Houghton	477
Light-tight Dish	Adams	477
Ownligood Tray		477
Plate Lifter	Griffin	477

ENLARGING, COPYING AND REDUCING APPARATUS.

Club Enlar.	Adams	522
Club L.S.	Adams	522
Combined	Adams	523
Invicta	Noakes	521
Student's	Whittingham	524

FILMS (NEGATIVE).

Carbutt's	London Stereo	418
Celluloid	Adams	419
Celluloid	Fry	420
Isochromatic	Edwards	418
Landscape	Edwards	419
Short Spools	Eastman	Adden.

FILMS (POSITIVE), OPALS, &c.

Bromide Cards	Birm. P. Co.	422
Carbutt	London Stereo	422
Criterion	Birm. P. Co.	421
Criterion P.O.	Birm. P. Co.	422
Esmail Enamel	Guye	422
Fry's	Fry	422

FINDERS.

Cheap	Ward	367
Lothian	Baird	368

FLASH LAMPS.

Ajax	Ph. Enterprise	396
Aptus	Sharp	398
Blow-down	Marion	398
Champion	Griffin	399
Excelsior	Rooke	397
Mag Magazine	Martin	399
Nadar	London Stereo	390
Todd-Forret	Baird	396

LANTERN ACCESSORIES.

Condenser	Chadwick	554
Disc Adjustment	Platt	553
Ideal Dissolver	Archer	552
Lenses	Swift	554
Lenses	Wray	554
Micro and Micro-polariscope	Steward	553
Optimus Projector	P. S. and R.	551
Stock's Oil Lamp	Stocks	559

LANTERN EXHIBITION APPARATUS.

		PAGE
Carrier, Anti-halo	Steward	583
Carrier, Lift-lever	P. S. & R.	581
Carrier, New Lifting		583
Lecturer's Lamp	Chadwick	555
Lecturer's Lamp	Tylar	555
Optical Pointer	Steward	558
Registering Crosses	Steward	582
Registering Slide Runners	Steward	581
Screen	Riley	557
Screen and Stand	Hart	558
Screen Wall Map	Baird	557
Tripod	Riley	557

LANTERNS, BIUNIALS & TRIPLES.

Folding Biunial	Hughes	539
Invicta Triple	Riley	543
Premier	Steward	541
Superb Extra	Riley	540

LANTERNS, SINGLE.

Ideal	Archer	531
Japanned Tin		537
Mahogany Body		533
Metamorphoser		535
Pamphengos	Hughes	532
Terpuoscope		535

LANTERN SLIDE APPARATUS.

Binders and Mask, Combined	Baird	579
Binders, Metal	Moore	579
Binders, Metal	Ph. Enterprise	578
Clamp	Ph. Enterprise	577
Cromoscope	Adams	585
Lanternscope Tinter	Tylar	585
Masks	Wormald	579
Masks, Coloured	Vevers	580
Masks, Micro	Wormald	579
Masks, Ready-marked	Wheeler	578
Masks, Spot	Fry	580
Pantoscope	Adams	583
Pantoscope, Binoc	Adams	584
Printing Frame	Dore	576
Printing Frame	Martin	576
Printing Frame	Middlemiss	576
Printing Frame	Wormald	575
Reflecting Lanternscope	Tylar	584
Reflecting Lanternscope Binoc	Tylar	585
Revolving Vice	Adams	577
Scanlan's Film holder	England	585

LANTERN SLIDES.

EDUCATIONAL AND HISTORICAL.

Animal Studies	Wilson	591
Army and Navy	Gregory	591
Church of England	York	592
Easter, Ascension and Whitsuntide	York	592
Educational	Ward	592
Grace Darling's Home	Wilson	591
Hop-picking in Kent	York	592
Ice Crystals	Martin	592
John Wesley	York	591
Kingsley's Home	Wilson	591
Lent	York	592
Manchester Ship Canal	Ward	592
Scotland, Architecture of	Wilson	590
Sports and Athletics	Wilson	591
Stations of the Cross	York	592

HUMOROUS, &c.

		PAGE
Absent Man	York	597
Amateur Skatist	Underhill	595
Boys and Bobby	Underhill	595
Cats at Play	Wilson	593
Cat Studies	York	594
Clergyman In Norway	York	594
Cloud and Water Effects.	Wilson	523
Crisermas Goose	Underhill	595
Demon Cat	Wilson	593
"Eider" Stranded	Knight	595
Hat Trick	Underhill	595
Hunting ye Hare	Underhill	595
Photography and its Victims	Underhill	594
Portraits	Wilson	593
Sandringham Hall	Underhill	595
Sausage Story	Underhill	595
Snap Shots	Wilson	594
Snow and Frost Studies.	Wilson	593
Snowball, Tale of a	Underhill	595
Tippoo the Tiger	Wilson	593
Tour in the North	Wilson	593
Whimsicalities	Wilson	593
World Inverted	York	594

SCENERY, TOURS, &c.

Adelaide	York	589
Athens, Antiquities	Wilson	590
Cathedrals	Wilson	589
Congo	York	590
Germany	Fincham	589
Giant's Causeway	Wilson	589
Holy Land	Frank'in	590
Madeira	Fincham	589
Melhourne	York	589
Monaco and French Riviera	Wilson	590
Monaco and Marltime Alps	Wilson	590
Nile	Wilson	589
Pacific	Wilson	590
Pyramid, Great	York	589
Riviera	York	590

STORIES, TALES, &c.

Aurelia's Young Man	York	593
Bells of Shandon	York	593
Bridge of Slghs	York	592
Fireman's Wedding	York	593
In His Keeping	York	592
Jane Conquest	York	593
May Queen	York	593
Parish Clerk	York	593
Ten Nlghts in Bar Room	York	592

VARIOUS.

Athenæum	Albion Co.	587
Film Slides	Pumphrey	588
Gelatlne		587
Wheel of Life	Pumphrey	588

LANTERNS, SPECIAL.

Combined		545
Cornell		546
Electric		544
Electric	Hughes	548
Perfect Biunial	Chadwick	549
Perfect Micro.	Chadwick	550
Scientist	Hughes	548

LENSES.

Anastigmatlc	Marion	377
Black Band	London Stereo	380
Concentric	Ross	Adden.
Detective	Taylor	381
Detective	Vevers	380
Facile	Fallowfield	378
Flanged 10 Slide	Taylor	381
Hand Camera	Crouch	380
Hand Camera	Swift	Adden.
Ideal	Adams	378
Isochromatic Screen	Brit. Works	382
New Landscape	Wray	382
Pinhole Diaphragm	Photo Enterprize	383
Premium Portrait	Watson	378
Royalty	L. & P. Optic	383
R. Rectilinear	Loman	379
R. Rectilinear	Morley	379
Stereoscopic	P. S. & R.	380
Tele-photo	Dallmeyer	373
Universal Shade	Marion	383
W. A. Eurysscope	P. S. & R.	377
W. A. Rectilinear	Loman	379

LIMELIGHT APPARATUS.

Cylinders	Scotch Oxy Co.	569
Cylinder, Label for	Steward	569
Cylinder, Stand for	Scotch Oxy Co.	573
Cylinder, Table of Contents	Scotch Oxy Co.	571
Cylinder, Testing	Scotch Oxy Co.	568
Dissolver, Cut Off	Steward	564
Dissolver, Double Plug	Steward	565
Dissolver, Simplex	Hughes	565
Jet Holder	Stainforth	567
„ Premier	Steward	566
Lock-up Guard		563
Pressure Gauge, Pocket		573
Pressure Gauge, New	Scotch Oxy Co.	573
Regulation, Brier's H.P.	Scotch Oxy Co.	563
Regulator, Brler's L.P.	Scotch Oxy Co.	562
Regulator, Brler's, with Gauge	Scotch Oxy Co.	563
Regulator, Lever Movement	Hughes	560
Regulator, Non-automatic	Noakes	561
Regulator, Suiter's		566
Valve, Brier's Glazed	Scotch Oxy Co.	570
Valve, Fine Adjustment	Scotch Oxy Co.	572

MOUNTS AND MOUNTING.

Cameo Press	Fallowfield	494
Card Frames	Marion	494
Mounts, Christmas	Adams	496
Mounts, Frame	Adams	496
Mounts, Plate	Fallowfield	495
Mounts, Platinotype	Fallowfield	496
Mounts, Silver Grey	Marion	494
Mounts, S.G. Plate	Marion	495
Mounts, Vista	Lund	495
Print Drying Pad	Lund	497

PAPERS (DEVELOPED).

Eastman E.R.	Eastman	427
Ilford Bromide	Brit. Works	427
Kallitype No. 2	Birm. Photo	429
New Platinotype	Plat. Co.	Adden.

PAPERS (PRINT OUT).

Backing Papers	Wheeler	437
Ce loidin	Fallowfield	435
Criterion	Birm. Photo	434
Diagrams for Cutting Paper		431
Ilford	Brit. Works	430
Jacoby	Scholzig	434
Luminotype	Adams	437
Matt Surface	Baird	434
Simplex	Smith	434
Soltype	Fry	43

PAGE

PLATES.

Anti-halation Paper ..... Wheeler 420
Backing Paper ..... Lund 420
Black Band ..... Lon. Stereo ... 418
Cardboard Protectors ... Wheeler 420
Cathcart ..... Verel ..... Adden.
Climax ..... Griffin ..... Adden.
Foreign Sizes ..... Adden.
Ilford Isochro ..... Brit. Works ... 314
Ilford Red Lahel ..... Brit. Works ... 417
Imperial ..... Imperial Co. ... 417
Large Sizes ..... Adden.
Nys ..... L.&P. Optic Co. 418
Sandell ..... Thomas ..... Adden.
Studio ..... Elliott 418

PRINT APPARATUS.

Print Cases ..... Wheeler 493
Print Hangers ..... Photo Enterprise 493

PRINTING FRAMES.

Daisy ..... Shew 484
Full View ..... Birm. Photo ... 485
Safety ..... Birm. Photo ... 485

PRINTING ROOM (VARIOUS).

Negative Holder ..... Vevers 483
Oxy Hydro Mag. Lamp .. Platinotype ... 490

PRINT TRIMMERS.

Aptus Cutter ..... Sharp 488
Card Cutter ..... Fallowfield ... 489
Cutting Knives ..... Fallowfield ... 490
Parallel Trimmer ..... Adams 489
Revol. Table ..... Hunter 488

RETOUCHING DESKS, &c.

Cheap ..... Griffiths 483
Common Sense ..... McGhie 483
Retouching Set ..... Adams 484

SETS OF APPARATUS.

Adams & Co. 503
Archer & Sons 504
Baird, A. H. 504
Fallowfield, J. ..... 505 & Adden.
Griffin & Sons 505
Lancaster & Son 505
London Stereo Co. 507
London and Paris Optic Co. 508
Marion & Co. 508
Murray, R. C. 508
Noakes & Son 509
Parker & Co. 509
Reynolds & Branson 509
Watson & Sons (Micro.) 511
Whittingham & Co. 510
Wood & Co. 511

SHUTTERS.

Acme ..... Watson 406
All Round ..... Tylar 404
Constant ..... Gotz 413
Focal Plane ..... Thornton 410
Hand Camera ..... Marion 403
Iris Eclipse ..... Shew 414
Kershaw ..... Marion 411
Loman's L.E. ..... Loman 413
Metal Drop ..... Tylar 404
Micklewood's ..... Micklewood ... 407
Mignon ..... Whittingham .. 408
New Blind 414
Norden Stereo ..... Mitchell 412
Rebound ..... Vevers 411
Safety ..... Tylar 405
Safety Blind ..... Thornton 410
Safety Snap Shot ..... Thornton 409

PAGE

Sector ..... Marion 412
Sky Shade Window ..... Tylar 405
Snap Shot ..... Thornton 409
Stereoscopic ..... Gotz 410

SOLUTIONS.

Burnishine ..... Hunter 443
Cresco-fylma ..... Hill Bros. 443
Theonine ..... Marion 442
Toning Bath ..... Adams 444
Toning Bath ..... Fallowfield ... 442
Toning Bath ..... Fry 443
Toning Bath ..... Hinton ..... Adden.
Waterproof Varnish ..... Hinton ..... Adden.

STUDIO ACCESSORIES.

Accessories ..... Scholzig 399
Chair Rest ..... Harrison 401
Combined Rest ..... Fallowfield ... 401
Head Rest ..... Fallowfield ... 400
Lawn Studio ..... Hart 402
Pilsen Electric Lamp ... Pilsen Co. ... Adden.

STUDIO STANDS.

Automatic ..... Mason 391
Buttram's ..... Marion 392
Large ..... Marion 391
Rigid ..... Grayson 390
Semi-Centennial ..... McGhie 391

TRIPODS.

Ashford's ..... Ashford 389
Bamboo ..... Park 386
Cup and Ball Head ..... Fallowfield 393
Extra Light ..... Hinton ..... Adden.
Lightning ..... Adams 388
Lothian Adjustable ..... Baird 384
Scorer's ..... Scorer 384
Stick ..... Fallowfield ... 388
Tripod Securer ..... Mason 392
Walking Stick ..... Fallowfield 390
Walking Stick ..... Lizars 387
Walking Stick ..... Talbot 386

VARIOUS.

Aristo Colours ..... Hinton ..... Adden.
Etching Process ..... Baird 515
Ivorine Tablets ..... Tylar 517
Nameit ..... Gray 515
Norden Stereoscope ..... Mitchell 512
Photographs, Animals ... Wilson 517
Photographs, Eider ..... Knight 518
Photographs, Ice Crystals ..... Martin 517
Photo cript ..... Lindner 514
Stereoscopic Frames ... Moore 512
Stereoscopic Masks ..... Wormald 512
Tachyscope ..... Blackfriars ... 513
Torsloscope ..... Adams 513
Transparency Frames ... Fallowfield 498

VIGNETTING APPARATUS.

Clips ..... Photo Enterprise 486
Revolving Table ..... Houghton 486

WASHERS.

Combined ..... Tylar 480
Double Action ..... Hunter 481
Firth's ..... Marion 479
Jefferies ..... Fell 480

WASHING RACKS.

Expanding Rack ..... Tylar 482
Washing Rack ..... Griffin 481

INDEX TO SECTIONS V. & VI.

THE ARTICLES ARRANGED ACCORDING TO FIRMS

ABBREVIATIONS USED.

Acces.....Studio Accessories.
Actin.....Actinometers.
Adden. .....Addenda.
Bur. .....Burnishers.
Cam. .. ..Cameras
Chem......Chemicals.
Ch. Tent. ...Changing Bags and Tents.
.....Prepared Developers.
Devel. App. Developing Apparatus.
D. R. Fit. ...Dark Room Fittings.
Enlar. .....Enlarging & Reducing Apparatus
Lamp.....Dark Room Lamps.
Lan. Acces. Lantern Accessories.
Lan. Exh....Lantern Exhibition Apparatus.
Lan. Slides Sets of Slides, &c.
Lime......Limelight Apparatus.
L. S. App....Lantern Slide Apparatus.
Mount. .....Mounts and Mounting Apparatus
Negt. .....Cloud and Border Negatives.
Ptg. Fr......Printing Frames.
Ptg. Trim...Print Trimmers.
Port. D.R....Portabl Dark Rooms.
Retouch.....Retonching Desks.
Sets.....Complete Sets and Outfits.
Slides.....Dark Slides and Carriers.
Sol......Solutions and Preparations.
Spec. Lan....Special Lanterns
Stereo.....Stereoscopic.
Vig .....Vignetting Apparatus.

ADAMS .....Cam. 290, 291, 310; Hand Cam., 331, 350, 354; Lens, 378; Tripod, 388; Films, 419; Paper, 437; Sol., 444; D. R. Fit., 460, 462, 478; Devel. App., 477; Retouch., 483; Negt. 487; Ptg. Trim., 489; Mount., 496; Sets, 503; Torsioscopic, 513; Enlar., 522, 523; L. S. App., 577, 583, 584, 585.

ALBION Co. .....Lan. Slides, 587.

ARCHER ....Cam., 293; Sets, 504; Lantern, 531; Lan. Acces.

ASHFORD .....Cam., 284; Hand Cam., 318; Tripod, 389.

BAIRD.....Hand Cam., 352; Slides, 567; Finder, 368; Plummet, 369; Tripod, 384; Flash Lamp, 396; Paper, 434; Lamp, 471; D. R. Fit., 466, 467, 479; Sets, 504; Etching Process, 515; Lan. Exh., 557; L. S. App., 579, 580.

BAKER, W. .....Ch. Tent, 449, 450, 452.

BECK .....Book, 518.

BENHAM AND FROUD .....Lamp, 471.

BERESFORD.....Ch. Tent. Adden.

BEYER .....Hand Cam., 338.

BIRMINGHAM PHOTO Co. .....Opals, 421, 422; Bromide Cards, 422; Paper, 429, 434; Lamp, 472, 473; Ptg. Fr., 485.

BLACKFRIARS Co. ....Hand Cam, 345; Spec. Cam., 358; Tachyscope, 513.

BRAINE.....Cam., 308, 310, 311, 313, 314.
BRITANNIA WORKS Co. .....Lens, 382; Plates, 415, 417; Paper, 427, 430; Book, 518.
BROOKER .....Hand Cam., 330.
CHADWICK .....Spec. Lamp, 549, 550; Lan. Acces., 554; Lan. Exh., 555.
CROUCH .....Hand Cam, 352, 355, 356; Lens, 380.
DALLMEYER.....Lens, 373.
DAVENPORT.....Ch. Tent, 449; Port. D.R., 453, 455, 456, 457, 458, 459; D.R. Fit., 460, 461, 462.
DORE .....L.S. App., 576.
EASTMAN .....Hand Cam., 339; Paper, 427. New Kodaks. Adden.
EDWARDS .....Shutter, 414; Films, 418, 419; Devel., 441. Film Slides and Carriers. Adden.
ELLIOTT & SONS..Plates, 418.
ENGLAND .....L.S. App., 585.
FALLOWFIELD.....Cam, 293; Hand Cam., 315, 353; Spec. Cam., 361; Lens., 378; Tripod, 388, 390, 393; Acces., 400, 401; Paper, 436; Sol., 442; Ch. Tent, 448, 450; Lamp, 468, 470; Ptg. Trim., 489, 490; Bur., 491; Mount, 494, 495, 496; Sets, 505, Adden.; Trans. Frames, 498.
FELL.....Washer, 480.
FIELD .....Actin., 394.
FINCHAM.....Lan. Slides, 589.
FITCH.....Focus Screen, 368.
FRANKLIN .....Lan. Slides, 590.
FRANKS .....Hand Cam., 324.
FRY .....Films, 420; Opals, 422; Papers, 435; Sol. 443; L.S. App., 580.
GELATINE SLIDE BUREAU .....Lan. Slides, 587.
GOTZ .....Slides, 367; Shutter, 410, 413; Devel. App., 477.
GRAY .....Nameit, 515.
GRAYSON .....Studio Stand, 390.
GREEN .....Negt., 483.
GREGORY .....Lan. Slides, 591.
GRIFFIN .....Flash Lamp, 399; Lamp, 471; Devel. App., 477; Rack, 481; Sets, 505. Plates. Adden.
GRIFFITHS.....Hand Cam., 349; Retouch., 483.
GUYE .....Enamel, 422.
HARDCASTLE .....Devel., 441.
HARRIS .....Hand Cam., 336; Lamp, 467.
HARRISON .....Acces., 401.
HART .....Acces., 402; Lan. Exh., 558.
HILL BROS. .....Sol., 443.
HINTON .....Tripod, Sol, Bottle, Colours. Adden.
HOUGHTON.....Cam., 298, 299; Hand Cam., 342; Devel. App., 477.
HUGHES .....Lantern, 532, 539; Spec. Lan., 548; Lime, 560, 565.
HUNTER.....Sol., 443; Lamp, 469, 472; D.R. Fit., 461; Washer, 481; Ptg. Trim., 488; Bur., 493.
HURMAN.....Cam., 292.
IMPERIAL PLATE Co .....Plates, 417.
KING .....Hand Cam., 342, 343, 352.
KNIGHT .....Photographs, 518; Lan. Slides, 595.
LANCASTER.....Cam., 296, 298; Hand Cam., 344, 347; Lamp, 475; Sets, 505.

LAWRENCE .....Hand Cam., 327, 345.
LEV .....Cam. Case, 368; Lamp, 471.
LINDNER.....Photoscript, 514.
LIZARS.....Tripod, 387; Lamp, 475.
L. & P. OPTIC Co...Cam., 282, 285; Lens, 383; Plates, 418; Sets, 508. Lamp, Ch. Tent. Adden.
LONDON STEREO Co. .....Cam., 303; Hand Cam., 338, 341; Slides, 367; Lens, 380; Flash Lamp, 399; Plates, 418; Films, 418, 422; Devel, 441; Sets, 507.
LONSDALE.....Cam., 285; Turntable, 368; Bur., 492.
LOMAN .....Cam., 297; Hand Cam., 349; Lens, 379; Shutter, 413.
LUND .....Backing Paper, 420; Mount, 496, 497; Album, 498, 499; Book, 518, 519.
MANSON.....Focus Cloth, 368.
MARION .....Cam., 284; Hand Cam., 332, 334; Lens, 377, 383; Studio Stand, 391, 392; Actin., 395; Flash Lamp, 398; Shutter 403, 411, 412; Sol, 442; Washer, 479; Bur., 491; Mount, 494, 495; Album, 500; Sets, 508.
MARTIN, G. S......Flash Magazine, 399.
MARTIN & Co......Photographs, 517; Lan. Slides, 592.
MASON .....Tripod, 392; Studio Stand, 391.
MAWSON & SWAN Book, 520.
McGHIE .....Cam., 312; Hand Cam., 348; Studio Stand, 391; Retouch, 483; Album, 499, 501.
MERCER .....Hand Cam., 320, 325.
MICKLEWOOD.....Shutter, 407.
MIDDLEMISS .....L.S. App., 567.
MILLER.....Hand Cam., 335.
MITCHELL .....Cam. 309; Shutter, 412; Stereoscope, 512.
MOORE .....Stereo Frames, 512; L.S. App., 579.
MORLEY .....Cam., 303, 306; Lens, 379; Album, 501.
MURRAY .....Sets, 508.
NEWMAN.....Changing Box. Adden.
NOAKES .....Cam., 283; Sets, 509; Enlar., 521; Lime, 561.
OVEREND .....Fort. D.R, 455.
PARK .....Tripod, 386.
PARKER .....Cam., 300; Hand Cam., 326; Sets, 509.
PEARSON and DENHAM .. ..Cam., 295.
PERKEN, SON and RAYMENT ...Cam., 289; Hand Cam., 329, 348; Lens, 377, 380; Lan. Acces., 551; L.S. App., 581.
PHOTO ENTERPRISE .....Lens, 383; Flash Lamp, 396; Vig., 486; Print Hanger, 493; L.S. App., 577, 578.
PILSEN Co. .....Electric Lamp. Adden.
PLATINOTYPE Co. .....Lamp, 490. New Paper. Adden.
PLATT & WITTE...Lan. Acces., 553.
PUMPHREY .....Lan. Slides, 588.
REYNOLDS AND BRAMSON .....Lamp, 469 Sets, 509.
RILEY.....Lantern, 540, 543; Lan. Exh., 557
ROBERTS.....Hand Cam., 340, 345.
ROOKE .....Flash Lamp, 397.
ROSS .....Hand Cam., 355. Lens. Adden.
ROUCH .....Hand Cam, 322.

SANDS HUNTER Cam., 289; Slides, 366.
SCHOLZIG ... .Acces., 399; Paper, 434.
SCORER .....Cam., 286; Tripod, 384.
SCOTCH & IRISH OXYGEN CO. ...Lime, 562, 563, 568, 569, 570, 571, 572, 573.
SHARP & HITCHMOUGH .....Plummet, 368; Flash Lamp, 398; Acces., 400; Lamp, 474; Ptg. Trim, 488; Album, 501. Hand Cam. Adden.
SHEFFIELD PHOTO CO......Hand Camera, 326; Ch. Tent, 451.
SHEW.....Shutter, 414; Ptg. Fr., 484. Hand Cam. Adden.
SLATER.....Cam., 283.
SMITH .....Paper, 434.
STANIFORTH .....Lime, 567.
STANLEY.....Cam., 305; Actin. 396.
STEWARD .....Lantern, 541; Lan. Acces., 553; Lan. Exh., 558; Lime, 564, 565, 566, 569; L. S. App., 581, 582, 583.
STOCKS .....Oil Lamp, 559.
STRETTON.....Cycle Carrier. Adden.
SWIFT .....Lan. Acces., 554. Lenses. Adden.
SWINDEN & EARP Hand Cam., 329.
TALBOT & EAMER Hand Cam., 352; Tripod, 386.
TAYLOR & HOBSON.....Lens, 381.
THOMSON.....Slides, 366.
THORNTON-PICKARD.....Cam., 302; Shutter, 409, 410.
TYLAR .....Cam., 394; Hand Cam., 337, 343, 346; Spec. Cam., 361; Slides, 366, 67; Plumb, 369; Level, 369; Shutter, 404, 405; Lamp, 468, 474, 476; D.R. Fit., 463; Washer, 480; Rack, 482; Bnr. 492; Ivorine Tablets, 517; Book, 520; Lan. Exh., 555; L S. App., 584, 585.
UNDERHILL .....Lan. Slides 594, 595.
VEVERS.....Cam., 312; Lens, 380; Shutter, 411; Devel. App., 478; Neg. Holder, 483; L.S. App., 580.
WARD, A. .....Finder, 367; Lan. Slides, 592.
WARD, W. S......Clip. Adden.
WATKINSON .....Cam., 291, 294.
WATSON .....Cam., 307; Hand Cam., 336; Spec. Cam., 363, 365; Lens, 378; Shutter, 406; Micro Sets, 511.
WEARE ....Orderly Folio, 498.
WHEELER .....Anti-halation Paper, 420; Card Protectors, 420; Paper, 437; Print Case, 493; Book, 520; L.S. App., 578.
WHITTINGHAM ...Cam., 296, 301, 308; Shutter, 408; Sets, 510; Enlar., 524.
WILSON.....Photographs, 517; Lan. Slides, 589, 590, 591, 593, 594.
WOOD & Co......Sets, 511.
WORMALD .....Spec. Cam., 357; D.R. Fit., 461; Stereo Masks, 512; L.S. App., 575, 578.
WRAY .....Lens, 378; Lan. Acces., 554.
YORK .....Lan Slides, 589, 590, 591, 592, 593, 594.

INDEX TO AUTHORS

WHOSE WRITINGS ARE QUOTED IN SECTION III.

PAGE

ABNEY, W. de W. 70, 96, 107, 124, 153
Acworth, J. J. 72, 74, 82, 88, 108
Adams, W. P. 76
Addenbrooke, G. 81
Andresen 85, 88
Angerer, V. 85, 94
Armstrong, H. 76, 80
Astronomer Royal 125, 126, 127, 142, 144

BACHRACH, D. 97
Baker, G. R. 170
Balagny 92, 96
Baltin, P. 94
Bamberger 82
Barnard 117, 118
Barus, C. 74
Baskett, W. K. 87
Beach, F. H. 90
Beale, H. H. 81
Bedding, T. 85
Bell, W. 94
Benedikt 82
Bevan, E. J. 79
Biggelow, Prof. 145, 146
Bolton, W. B. 178
Bond 132
Booth, D. 157
Bothamley, C. H. 77, 102, 103, 105, 171
Boys C.V. 70
Brann, C. 147
Bray, T. J. 101
Brebner, H. 96
Brennard, W. 165
Brodie, F. J. 163
Brown, W. 101
Brunel, P. 98
Buchler, E. 99
Burnham 116, 117, 118
Burton, W. K. 85, 86, 96, 101, 104, 171
Busche 98

CALDERWOOD, A. H. 90, 104
Carbutt, J. 105, 107
Caufyn, B. 107
Chable, E. 86
Chandler 134
Chapman 94
Charlier 126
Charpy, G. 72, 78
Charroppin, Prof. 145
Clark, Lyonel 172
Clayden, Arthur W. 162, 163
Clemons, J. R 99
Clerke, Miss 118, 119
Colgrave, E. J. 107
Common, Dr. A. A. 155
Conscience, J. 88
Corner 149
Cornish, A. 67
Courby 118
Cowan, A. 100
Cross, C. F. 76, 79

PAGE

DALLMEYER, T. R. 166, 167, 171
Debenham, W. E. 171
Degoix, L. 90
Demole, E. 91, 95
Deslandres 141
De Varda, G. 73
Driffield (see Hurter) .....
Drinkwater 97
Duchochois, P. C. 82, 107

EDER, J. M. 70, 71, 87, 89, 108, 172
Edwards, B. J. 82
Ehrmann, C. 107
Elder, H. M. 74
Elger 150
Espin 123
Evershed 148

FLEMING, Mrs. 138
Foxlee 82

GAEDICKE 111
Gautier 124
Gautier, H. 72, 78
Gill, Dr. 140, 141, 156
Goderus, A. 68
Gony 68
Goolds, E. 103
Gore 135
Gould, Dr. 129
Gravier 68
Gundlach, E. 168
Guntz 75, 76

HAGEN, S. J. 133
Harrison, R. W. 98
Harrison, W. J. 100
Hartley, W. N. 72
Hale, Prof. G. E. 142, 146, 147
Hastings, H. M. 172
Hempel, W. 78
Hendrick, J. 79
Henry, The Bros. 134, 141
Higgs 108
Higgs 160
Hind 116
Hitchcock, R. 76
Hodges, J. 101
Holden, Prof. 117, 118, 133, 151, 152, 154
Huffel, C. 84
Huggins 140, 141
Humphrey, E. J. 72
Hurter, F. 69, 70
Huszar, A. 104

JACOBY 134
Janssen 149
Jeserich, P. 70
Jonas, A. 109
Jones, C. 69, 70, 95

PAGE

KANDELER 86
Kapteyn, Prof. 129
Kastner, E. 87
Klein, Dr. 151
Klinger, H. 73
Koerber 141
Koulgenko, B. 84
Krämer, J. 99
Krause 98
Kröhnke, B. 94
Kunisch 17

LABATUT 112
Lainer, A. 68, 78, 81, 92, 94, 95
Lamy 98
Latimer, F. H. 102
Lea, M. Carey 73, 75
Leaper, C. J. 85
Leech, H. R. 83
Lemoine, G. 67
Lenhard, P. 93
Leslie, J. W. 82
Liesegang, R. 112
Lippmann, G. 111
Liversedge, A. 78
Lockyear, Prof. 160
Lohse 147
Lohse, O. 94
Lumière, A. & L. 88, 89, 90, 176

MACDONA, L. 106
Mackean, W. 72
Marfori, P. 78
Maunder 131, 143, 144
McClean, Frank 149
Meldola, R. 74, 75, 83
Mercier, P. 79, 97, 98, 99
Meyer, B. 105
Michalke 68
Miethe, A. 89, 93, 106, 111, 167
Miller, J. R. 97
Minchin, G. 112
Mitchell, C. .....
Moissan, H. 79
Molesworth, Lieut. P. B. 153

NEILSEN, VICTOR 121, 157
Nelson, E. M. 173
Neuhauss, R. 68, 69, 90
North, J. 73

OLZEWSKI, K. 70

PELLECHET 93
Perkins, F. P. 107
Pickering, W.H. ... 120, 133, 134, 136, 137, 138
Planchon 82
Plummer 125
Pope (see Amstrong) .....
Prange, A. J. A. 73
Pricam, A. 81
Pringle, A. 107
Pritchard, Prof. 117, 126, 128, 130, 131
Pritchett, H. S. 144
Prohst, F. 74
Putz 71

RABOURDIN 118
Ranyard, Dr. 120, 122, 143
Rayet 118
Rayet 154
Rayleigh, Lord 70
Rawlins, H. J. L. 96

PAGE

Rebikow, W. 83
Redwood 72
Reeh, H. 87, 90, 91
Regnard, P. 67
Renz 154
Reynolds, J. E. 80
Richardson, A. 67, 76
Rideal, S. 82
Riggenbach, Dr. 162
Rigollet 68
Rivänd 79
Roberts, M. 116, 121, 156
Rowland, H. 70
Rowlands, Prof. 149
Russell 120

SACHERS, R. T. 105
Safford, Prof. 133
Sasse, C. 97
Sauer, C. 81
Scheiner 139
Scheiner, Dr. 125
Schlensoner 94
Schnauss, J. 86
Schneider, E. A. 74
Schoeherle 126, 145
Schooling 132, 153
Schranim, J. 73
Schumann, V. 68, 75, 76, 108
Sherman, W. 97, 98
Sizer, N. B. 77
Slick, B. 101
Smyth, Prof. Piazzi 149
Standage, H. C. 82
Standke, O. 73
Stehhins, J. H. 79
Steinheil 167
Stohze, F. 69, 79, 101
Sutcliffe, F. M. 70
Sutton, H. 96, 175
Swan, J. 82

TALBOT, R. 101
Taylor, A. 124, 129, 130, 146
Taylor, F. B. 171
Taylor, J. Traill 167, 169, 172
Thiving, C. B. 112
Thompson, Prof. Sylvanus P. 70, 169
Trepied 118, 125

VALENTA, E. 71, 72, 77, 87, 89, 99, 100, 175
Verescz 111
Vidal, L. 109
Vogel, Dr. 138, 139, 140
Vogel, E. 72, 74, 79, 83, 95, 108
Vogel, H. W. 69, 79, 107, 108, 112
Voigt, T. H. 97

WALL, E. J. 94, 98
Warnerke, L. 178
Waterhouse, J. 87, 96, 112
Weinck, Prof. 151
Wheeler, W. H. 171
Wilcox, J. 81
Wilde, F. 83, 96, 97
Wilkinson, W. T. 83
Williams 155
Willis, W. 103, 104
Wischerrop 99
Wolf, M. 93
Wolfe, Dr. Max 118, 119, 123, 125, 157
Woodhurn, W. E. 100

YOULE, W. E. 82
Young, Prof. 146
Young, W. C. 92

CONTRIBUTORS TO PHOTOGRAPHY ANNUAL.

	PAGE
Abney, Captain W. de W.	159
Alfieri, Bernard	187
"Amateur"	189, 214
Ardasseer, G.	37
Bishop, C. D.	195
Blake, Norman	196
Bolas, T.	174
Bothamley, C. H.	67
Carruthers, G. A.	198
Colebrook, H.	200
Daw, W. E., jun.	203
Earp, Thomas	205
Hastings, H. M.	208
Hodges, John A.	209
Hubback, Theodore R.	206
Jones, Chapman	166
"Lady in the Reception Room"	218
Lambert, Rev. F. C.	180, 222
Leach, H.	229
Leaper, Clement J.	231
"Olaf Merreleigh"	235
Parsons, F.	237
Perkins, Frank P.	242
Phillips, R. E.	665
Rawlings, W. J.	244
Richards, L.	245
Richardson, E. G.	254
Santer, Arthur	257
Smith, S. Henry	258
Sturmey, Henry	691, 709
Sutcliffe, F. M.	259
Taylor, Albert	115
Welford, Walter D.	279
Whipple, G. M.	162
Wilkinson, W. T.	261
Wood, C.	262



Dallmeyer's Lenses.

WIDE ANGLE LANDSCAPE LENS (Patent).

No.	Size of Plate.	Diameter of Lenses.	Equivalent Focus.	PRICE. Rotating Stop.			PRICE. Iris Diaphragm.		
	Inches.	Inches.	Inches.	£	s.	d.	£	s.	d.
1A	5 × 4½	1⅝	5¼	3	5	0	3	15	0
1	7¼ × 4	1⅝	7	3	15	0	4	5	0
2	8½ × 6½	1⅞	8½	4	10	0	5	0	0
3	10 × 8	2⅛	10	5	10	0	6	0	0
4	12 × 10	2½	12	7	0	0	7	15	0
5	15 × 12	2⅞	15	8	10	0	9	10	0
5A	15 × 12	2⅞	18	9	10	0	10	10	0
6	18 × 16	3	18	10	10	0	11	10	0
7	22 × 20	3⅝	22	14	0	0	15	10	0
8	25 × 21	4¼	25	19	0	0	20	10	0

WIDE ANGLE RECTILINEAR LENS (Patent).

No.	Largest Dimension of Plates.	Diameter of front Combination.	Back Focus.	Equivalent Focus.	PRICE. Rotating Stop.			PRICE. Iris Diaphragm.		
	Inches.	Inches.	Inches.	Inches.	£	s.	d.	£	s.	d.
*1AA	7¼ × 4½	⅞	3½	4	4	10	0	4	17	6
1A	8½ × 6½	1¼	4⅜	5¼	5	10	0	5	17	6
1B	10 × 8	1⅝	5½	6¼	6	10	0	7	0	0
1	12 × 10	1½	6½	7	7	10	0	8	8	0
2	15 × 12	2	7½	8½	10	10	0	11	0	0
3	18 × 16	2½	11	13	14	0	0	14	15	0
4	22 × 20	3	14	15½	20	0	0	21	0	0
5	25 × 21	3¾	17	19	30	0	0	31	5	0

* This lens is also well adapted for stereoscopic views.

PATENT STEREOGRAPHIC LENS.

Diameter of front and back combination 1⅛in. and 1¼in. respectively, and 3¾in. focus from the back glass (equivalent focus 5 inches).

	Iris diaphragm. £	s.	d.
In rigid setting with Waterhouse central diaphragms ...	4	5	0
In sliding mount, with Waterhouse central diaphragms ...	4	15	0
In sliding mount, with rack and pinion movement	5	5	0

COMPOUND TELE-PHOTOGRAPHIC LENSES.

(Protected December, 1891.)

	£	s.	d
PATENT STEREOGRAPHIC LENS, with No. 1 Neg. attachment (mounted in aluminium)	**10**	**0**	**0**
1B PATENT PORTRAIT LENS, with No. 2 Neg. attachment (mounted in aluminium) ...	**15**	**0**	**0**
2B PATENT PORTRAIT LENS, with No. 3 Neg. attachment (mounted in aluminium) ...	**22**	**10**	**0**

PARTICULARS OF NEGATIVE ELEMENTS.—Price, mounted in aluminium, No. 1, **£5**; No. 2, **£6 10s.**; No. 3, **£9.** Mounted in brass, No. 1, **£3 15s.**; No. 2, **£4 10s.**; No. 3, **£6 10s.**

DALLMEYER On the Choice and Use of Photographic Lenses," 1s.

J. H. DALLMEYER, Ltd., 25, Newman Street, London, W.

Telegraphic and Cable Address—"DALLMEYER LONDON."

Dallmeyer's Lenses.

Cash Prices of the Principal Portrait and View Lenses.

PORTRAIT LENSES.

EXTRA RAPID (C). QUICK ACTING (B).

RECTILINEAR PORTRAIT LENSES.

SEE DESCRIPTIVE CATALOGUE.

	Diaphragms. Waterhouse. £	s.	Iris. £	s.
ORDINARY INTENSITY (A)—Patent.				
1A, for Cabinets, in short rooms, diameter 2⅜in., distance 14ft. ..	13	0	14	5
2A, for Cabinets up to 8½ x 6½, diameter 3⅛in., distance 20ft. ..	18	0	19	10
3A, for Cabinets up to 9 x 7, diameter 4in., distance 24ft. ..	27	5	29	5
4A, for Imperial Portraits and 10 x 8, diameter 4⅛in., focus 14in.	38	10	41	0
5A, for plates 15 x 12 and under, diameter 5in., focus 18in. ..	50	0	53	10
6A, for plates 20 x 16 and under, diameter 6in., focus 22in. ..	60	0	64	0
PORTRAIT AND GROUP (D)—Patent.				
3D, Portraits 8½ x 6½, Views 10 x 8, diameter 2⅛in , focus 10½in.	9	10	10	5
4D, Portraits 10 x 8, Views 12 x 10, diameter 2⅝in., focus 13in.	13	10	14	15
5D, Portraits 12 x 10, Views 15 x 12, diameter 3¼in., focus 16in.	17	10	19	0
6D, Portraits 15 x 12, Views 18 x 16, diameter 4in., focus 19½in.	26	10	28	0
7D, Portraits 18 x 16, Views 22 x 20, diameter 5in., focus 24in.	48	0	50	0
8D, Portraits 22 x 20, Views 25 x 21, diameter 6in., focus 30in.	58	0	60	10

EXTRA RAPID RECTILINEAR LENSES.

(NEW SERIES.) *Larger sizes to order.*

No.	Largest Dimension of Plate.	Diameter of Lenses.	Equivalent Focus.	Price. Waterhouse Diaphragm.	Iris Diaphragm.
		Inch.	Inch.	£ s. d.	£ s. d.
1	5 x 4	⅞	4·9	6 0 0	6 10 0
2	6 x 5	1¼	6 9	7 7 6	7 17 6
3	8 x 5	1⅜	7 6	8 7 6	9 0 0
4	8½ x 6½	1½	8·4	9 15 0	10 10 0
5	9 x 7	1⅝	9·1	11 15 0	12 10 0
6	10 x 8	1¾	9·8	13 15 0	14 15 0
7	12 x 10	2	11·2	17 15 0	18 15 0

J. H. DALLMEYER, Ltd., 25, Newman Street, London, W.

Telegraphic and Cable Address:—"DALLMEYER, LONDON."

DALLMEYER'S LENSES.

RAPID RECT LINEAR LENS (Patent).

Size of View or Land-scape.	Size of Group or Portrait.	Dia. of Len	Bk. fo.	Eq. fo.	PRICE. Rigid Setting	Sliding Tube.	Rack and Pinion.	Iris Diaphragms Extra.
Inches.	Inches.	In.	In.	In.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
4¼ x 3¼	3¼ x 3¼	5/8	3½	4	3 15 0	4 0 0	4 10 0	0 7 6
*5 x 4	4¼ x 3¼	7/8	5½	6	4 10 0	4 15 0	5 5 0	0 7 6
†6 x 5	5 x 4	1¼	7½	8¼	5 10 0	6 0 0	6 10 0	0 7 6
8½ x 6½	6 x 5	1½	10¼	11	7 0 0	7 10 0	8 0 0	0 10 0
10 x 8	8½ x 6½	1¾	12¼	13	9 0 0	9 10 0	10 5 0	0 15 0
12 x 10	10 x 8	2	15	16	11 0 0	11 10 0	12 5 0	0 15 0
13 x 11	French Size.	2¼	16	17	12 0 0	12 15 0	..	0 15 0
15 x 12	12 x 10	2½	18	19½	15 0 0	15 15 0	..	1 5 0
18 x 16	15 x 12	3	22½	24	20 0 0	21 0 0	..	1 10 0
22 x 20	18 x 16	3¾	28	30	27 0 0	28 0 0	..	1 10 0
25 x 21	22 x 20	4	31	33	32 0 0	33 10 0	..	1 10 0

These Lenses are also well adapted for Stereoscopic Views, and can be had in pairs.

†*Originally constructed for plates* 6 *by* 5, *but may be used for plates intermediate between* 5 *by* 4, *and* 8½ *by* 6½, *such as* 7¼ *by* 4¾, *or* 8 *by* 5.

The 4¼ x 3¼ lenses are constructed for lantern pictures.

RAPID (LONG FOCUS) LANDSCAPE LENS.

No.	Largest Dimensions of Plate.	Diameter of Lenses.	Equiv. Focus.	PRICE. Waterhouse Diaphragm.	Iris Diaphragm.
	Inches.	Inches.	Inches.	£ s. d.	£ s. d.
1	6½ x 4¾	1½	9	4 10 0	5 5 0
2	8½ x 6½	2	12	5 15 0	6 10 0
3	10 x 8	2⅕	15	7 10 0	8 5 0
4	12 x 10	2⅔	18	9 10 0	10 10 0
5	15 x 12	3	22	11 10 0	12 10 0
6	18 x 16	3¼	25	14 0 0	15 10 0
	22 x 20	4¼	30	17 10 0	19 0 0

NEW RECTILINEAR LANDSCAPE LENS (Patent).

No.	Largest Dimensions of Plate.	Diameter of Lenses.	Equivalent Focus.	PRICE. Waterhouse Diaphragm.	Iris Diaphragm.
	Inches.	Inches.	Inches.	£ s. d.	£ s. d.
1	6½ x 4¾	1½	8½	4 15 0	5 10 0
2	8½ x 6½	1¾	11½	6 0 0	6 15 0
3	10 x 8	2	13½	8 0 0	8 15 0
4	12 x 10	2¼	16½	10 5 0	11 0 0
5	15 x 12	2¾	20	12 10 0	13 10 0
6	18 x 16	3	25	16 0 0	17 5 0
7	22 x 20	3½	32	21 0	22 5

J. H. DALLMEYER, Ltd., 25, Newman Street, London, W.

Telegraphic and Cable Address:—"DALLMEYER, LONDON."

Index to Advertisers.

NAME.	ARTICLES ADVERTISED.	ADDRESS.	PAGE.
Adams & Co.	Apparatus	81, Aldersgate Street, London, E.C.	xxix. to xxxvi.
Adams, R. T.	Camera-cases	90, Hatton Garden, London, E.C.	ccxxix.
Albion Albumenising Co.	Camoras and Paper	96, Bath Street, Glasgow	ccxiii. and ccxiv.
Alexander & Shepheard	"The Photographic News"	21 and 22, Furnival Street, Holborn, E.C.	cclxix.
Amphlett, Humphreys & Co.	Mounts	88, Brixton Hill, London, S.W.	ccxlv.
Appleton, R. J. & Co.	Apparatus	58, Manningham Lane, Bradford	cxciii. to cxcvi.
Archer & Sons	Optical Lanterns	43 to 49, Lord Street, Liverpool	clvii.
Ashford, James	Tripeds	179, Aston Road, Birmingham	ccxxx.
Atkinson, John J.	Apparatus and Materials	33 and 37, Manchester Street, Liverpool	ccxlv.
Baird, A. H.	Photographic Specialties	15, Lothian Street, Edinburgh	ccxxviii.
Benham & Froud, Ltd.	Lamps	Chandos Street, Charing Cross, London, W.C	clxxvi.
Beresford, F.	Changing Bags	14, Bridge Road West, Battersea, London, S.W.	ccxlvi.
Beyer, W.	Hand Cameras	5, Kelly Street, Kentish Town, London, N.W	ccxlv.
Birmingham Photographic Co., Ltd.	Apparatus and Materials	100, Gladstone Road, Sparkbrook, Birmingham	cliv.
Blackfriars Photographic and Sensitising Co.	Papers	1, Surrey Row, Blackfriars Road, London, S.E	lxv. to lxviii.
Bolas & Co.	Photo-mechanical Prints	11, Ludgate Hill, London, E.C.	clxiv.
Braine, J. & Sons	Cameras	22, Bedford Terrace, Moray Road, Holloway, London, N.	ccxlvi.
Britannia Works Co., Ltd.	Plates and Materials	Ilford, London, E.	xlix. to lvi.
Brooker, A.	Hand Cameras	52, Robertson Street, Hastings	clv.
Brookes, Warwick	"Limpet" Focusser	350, Oxford Road, Manchester	ccxlv.
Carbutt, John	Plates and Films	Wayne Junction, Philadelphia, Pa., U.S.A.	clxxvii.

Crouch, Henry, Ltd.	Cameras and Lenses.. ..	141, Oxford Street, London, W.	526
Dallmeyer, J. H.	Lenses	25, Newman Street, London, W.	865 to 867
Davenport & Co.	Dark Rooms	32, Parkhouse Street, Camberwell, London, S.E.	cclxv.
Day, Edward	Residues	28, Warston Lane, Birmingham	ccxlvi.
De Saulles, S & G. & Co. ..	Glass	52 and 54, Spencer Street, Birmingham ..	clxxviii.
Dollond & Co.	Materials and Apparatus ..	35, Ludgate Hill, London, E.C.	cclxxiv.
Eastman Photographic Materials Co., Ltd.	Cameras, Films, and Paper	115, Oxford Street, London, W.	717 to 722 & Cover
Edwards, B. J. & Co.	Plates, Films, Paper, etc. ..	The Grove, Hackney, London, N.E.	xlv. to xlviii., lxi. to lxiv.
Elliott & Son	Plates	Barnet, Herts	xxi.
Endolithic Ivory Co., Ltd. ..	Letters on Ivory	61½, Fore Street, London, E.C.	ccxxiii.
Fallowfield, J.	Materials and Apparatus ..	146, Charing Cross Road, London, W. ..	lxxxix. to xcvi.
Fitch, E. H.	Films	34, Angell Road, Brixton, London, S.W. ..	ccxlvi.
Franks, A.	Photographic Specialties ..	95, Deansgate, Manchester	clxv. to clxviii.
Freeman, H.	Materials and Apparatus ..	86 and 87, Fleet Street, London, E.C. ..	clxix.
Fry Manufacturing Co., Ltd.	Plates and Paper	5, Chandos Street, Charing Cross, London, W.C., and Kingston-on-Thames	Cover Cover
Gotz, J. R.	Apparatus and Materials ..	19, Buckingham Street, Strand, London, W.C.	xxiii. to xxiv., cclvi. and cclvii.
Graphotone Co.	Photo-mechanical Printing..	Battle Hill Park, Enfield, Middlesex	cclv.
Gray, Adam	"Nameit"	44, Snow Hill, London, E.C.	cxxiv.
Grayson, Hy.	Studio Stand	11, Newmarket Street, Blackburn	ccxlvii.
Griffin, Jas. D.	Glass, etc.	Floodgate Street, Birmingham	clxxix.
Griffiths, W. & Co.	Cameras	Highgate Square, Birmingham	276
Hannam & Co.	Mounts and Frames	Atlas Works, Gainsborough	ccxlviii.
Hardcastle & Co.	Printing Paper	71, East Street, Brighton	64
Harrington Bros.	Chemicals	Shandon Chemical Works, Cork	clxxiii.
Harris, P. & Co., Ltd.	Cameras and Electric Light	144 to 146, Edmund Street, Birmingham ..	clxxxi.

NAME.	ARTICLES ADVERTISED.	ADDRESS.	PAGE.
Harrison, J.	Head Rests	Woodhouse Lane, Leeds	cclxxi.
Hazell, Watson & Viney	"The Amateur Photographer"	1, Creed Lane, Ludgate Hill, London, E.C.	ccxlviii.
Henderson, Jas.	Apparatus and Materials	13, Crown Street, Aberdeen	ccxlvii.
Hicks, John A.	Photographic Work	291, New Cross Road, London, S.E.	clxxx.
Hinton & Co.	Photographic Chemicals	38, Bedford Street, Strand, London, W.C.	ccxxxii.
Hockin, Wilson & Co.	Lenses	New Inn Yard, 186a, Tottenham Court Road, London, W.	275
Holmes & Watson	Apparatus	35, Danbury Street, Islington, London, N.	ccxlvii.
Houghton, Geo. & Son	Cameras and Specialties	89, High Holborn, London, W.C.	cclxxviii to cclxxx
Hughes, W. C.	Optical Lanterns	Brewster House, Mortimer Road, Kingsland, London, N.	lvii. to lx.
Hume, Wm.	Enlarging Apparatus	3, Lothian Street, Edinburgh	ccxlvii.
Hurman, F. K. & Co.	Cameras and Paper	2, St. Nicholas Buildings, Newcastle-on-Tyne	clvi.
Iliffe & Son	Photographic Publications	Coventry, and 3, St. Bride Street, Ludgate Circus, London, E.C.	66, 598, 705, ccxxxiii., cclxxii., cclxxiii., ccxlviii., cclx.
Illingworth, Thos. Co.	Photographic Work	38, Sherriff Road, West Hampstead, London, N.W.	clxxxii.
Imperial Dry Plate Co.	Plates and Paper	Cricklewood, London, N.W.	184 and 662
Jackson, E. W.	Second-hand Goods	71, Oxford Street, Manchester	ccxlix.
Keene, R.	Photographic Printing	Derby	ccxlviii.
Lancaster & Son	Photographic Apparatus	Colmore Row, Birmingham	ci. to cxlviii.
Lawrance, C.	Cameras	141, Fulham Palace Road, Hammersmith, London, W.	clxxi.
Levi, S. J. & Co.	Photographic Specialties	17, Farringdon Road, London, E.C.	clxxxiii.
Liesegang, E.	Paper	Düsseldorf, Germany	ccxxx.

Lindner, P. A.	The "Photoscript"	170, Fleet Street, London, E.C.	ccxxiii.
Lloyd, Fred V. A.	Apparatus, etc.	5, South John Street, Liverpool	ccxxiv.
Loman & Co.	Cameras, etc.	90, Damrak, Amsterdam	ccxli. to ccxliv.
London & Paris Optic Co. ..	Plates	24, Edmund Place, Aldersgate Street, London, E C.	8
London Stereoscopic and Photographic Co., Ltd. ..	Cameras, Lens, etc.	106 and 108, Regent Street, London, W. ..	cclxxv. to cclxxvii.
Lonsdale Bros.	Camera Fittings	3, Cookridge Street, Leeds	ccxxvi.
Lucas, J. & Son	Lamps	Little King Street, Birmingham	clxiii.
Lund, Percy & Co.	"The Practical Photographer"	18, St. John Street, Bradford	cclxv.
McGhie & Co.	Apparatus and Materials ..	75, St. Vincent Street, Glasgow	ccliv.
Mander, E. & Son	Frames	Branston Street, Birmingham	ccxxxii.
Marion & Co.	Materials and Apparatus ..	22 and 23, Soho Square, London, W.	i. to viii.
Marlows, Ltd.	Cameras and Lamps ..	28 to 30, Constitution Hill, Birmingham ..	clxxiv. and clxxv.
Martin, J. & Co.	Photographic Work	New Southgate, London, N.	ccxxvii.
Mason, Geo. & Co.	Apparatus and Materials ..	180 to 186, Sauchiehall Street, Glasgow ..	ccxxviii.
Mawson & Swan	Plates	Mosley Street, Newcastle-on-Tyne	clix.
Mercer, R. & A. J.	Hand Cameras	16, King Street, Sparkbrook, Birmingham ..	ccli.
Middlemiss, Wm.	Cameras, &c.	Alice Street, Bradford	ccxvii. to ccxx.
Miller, T.	Hand Cameras	141, Broughton Road, Salford, Manchester ..	clxx.
Moore, Jas.	Ferrotype Plates and Lantern Slide Frames	18, Vauxhall Street, Birmingham	clviii.
Moorse, H.	Cameras	154, High Holborn, London, W.C.	ccxxxi.
Morgan & Kidd	Paper	Kew Foot Road, Richmond, Surrey	525
Morley & Cooper	Apparatus	70, Upper Street, Islington, London, N. ..	ccxxxiii.
Morison Bros.	Paper	99, Buchan Street, Glasgow	874
Murray, Robert	Apparatus and Materials ..	8, Garrick Street, London, W.C.	ccxlix.
Myers, C. A.	Enlargements	46a, Market Street, Manchester	ccxxv.
Nelson, Dale & Co., Ltd. ..	Gelatine	14, Dowgate Hill, London, E.C.	33, ccxlix.
Newman, James	Artists' Colours	24, Soho Square, London, W.	ccxxxiv.

NAME.	ARTICLES ADVERTISED.	ADDRESS.	PAGE.
Newman & Guardia	Apparatus	71, Farringdon Road, London, E.C.	2
Oeffelein & Co.	Enamelling	54, Berners Street, London, W.	ccl.
Paget Prize Plate Co.	Plates	Watford	Cover
Palmer, W. E. & Sons	Photographic Work	Bloom House, Leicester Road, New Barnet, London	ccxxxi.
Park, Henry	Cameras and Fittings	5, Station Buildings, Acton Street, Kingsland Road, London, N.E.	clii. and cliii.
Pearson & Denham	Cameras	5, New Street Station, Leeds	34
Perken, Son & Rayment	Photographic Apparatus	99, Hatton Garden, London, E.C.	ix. to xvi.
Perry, W.	Cloud Negatives	Grace Hill, Folkestone	ccl.
Pexton, Chatham	Optical Lanterns	150, Holborn, London, E.C.	596 and 597
Piper & Carter	Photographic Work	5, Furnival Street, Holborn, London, E.C.	cclxviii.
Place, J.	Shutters	13, Bull Street, Birmingham	ccxxxv.
Platinotype Co.	Paper and Specialties	29, Southampton Row, High Holborn, London, W.C.	cclxvi and cclxvii.
Platt & Witte	Optical Lanterns and Fittings	Birkbeck Works, Birkbeck Road, Ridley Road, Dalston, London, N.E.	clx.
Preston, J.	Dark Tents and Lamps	4, High Street, Sheffield	ccxxi.
Pumphrey, A.	Photographs	62, Stanhope Street, Birmingham	ccxxxv.
Roberts, W. G.	Hand Cameras	Leytonstone, London, E.	ccl.
Ross & Co.	Lenses and Cameras	112, New Bond Street, London, W.	lxix. to lxxiv.
Rouch, W. W. & Co.	Hand Cameras	180, Strand, London, W.C.	706
Sands, Hunter & Co.	Cameras, &c.	20, Cranbourne Street, London, W.C.	clxxii.
Schölzig, Oscar	Papers	Dashwood House, Broad Street, London, E.C.	ccxxvii.
Schölzig, Otto	Printing Papers	31, Binfield Road, Clapham Road, London, S.W.	xxii.
Scorer, Wm.	Cameras	North Street, Havant	ccl.

Sharp & Hitchmough	Naming Outfit	101 and 103, Dale Street, Liverpool	ccxxxvi.
Shew, J. F. & Co.	Hand Cameras, Shutters, &c.	87-88, Newman Street, London, W.	cclxx.
Smith & Son	Washer	102, Parade, Leamington	852
Steward, J. H.	Optical Lanterns	406, Strand, London, W.C.	183
Swift, J. & Son	Lenses	18, Tottenham Court Road, London, W.	63
Talbot & Eamer	Photographic Specialties	7, 9, and 11, Exchange Street, Blackburn	cclxi. to cclxiv.
Talbot, Romain	Apparatus and Materials	46, Kaiserwilhelmstrasse, Berlin, C.	ccxxii.
Taylor, Taylor & Hobson	Lenses	6, Southampton Street, London, W C.	xcviii. to c.
Thomas, R. W. & Co., Ltd.	Plates	10, Pall Mall, London, S.W.	xvii. to xx.
Thornton-Pickard Manufacturing Co.	Shutters, Cameras, &c.	St. Mary's Street, Deansgate, Manchester	clxxxv. to cxcii.
Trapp, L. & Co.	Paper	1, Bridge Row, Cannon Street, London, E C.	ccli.
Tylar, Wm.	Hand Cameras	57, High Street, Aston, Birmingham	clxxxiv.
Verel, F. W. & Co.	Plates and Paper	Cathcart, near Glasgow	ccxv. and ccxvi.
Vevers, C. C.	Photographic Specialties	12, Market Street, Briggate, Leeds	ccxxxvii. to ccxl.
Wachtl, Bernhard	Card Mounts, &c.	Kirchberggasse 37, Vienna	ccli.
Walker, J.	Cameras	22, Charles Street, Bradford	ccxxvi.
Waterlow & Sons, Ltd.	Photo-mechanical Printing	Finsbury Stationery Works, London, E.C.	cclii and ccliii.
Watkinson & Co.	Cameras and Fittings	New Briggate Street, Leeds	clxi.
Watson, John	Cameras and Lenses	34, Grainger Street, Newcastle-on-Tyne	ccxxx.
Watson, W. & Son	Cameras and Lenses	313, High Holborn, London, W.C.	xxxviii. to xliv.
Welby, D. & J.	Residues	18 and 20, Garrick Street, Covent Garden, London, W.C.	ccxxix.
Welford, Walter D.	"Photographic Review of Reviews"	47, Hagley Road, Birmingham	cclviii.
Wheeler, Geo. & Co.	Photographic Specialties	46, King Street West, Manchester	ccxxxiv.
Wilson, G. W. & Co.	Photographs and Slides	2, St. Swithin Street, Aberdeen	clxix.
Wood Bros.	Cameras	73, Lord Street, Liverpool	ccxxxvi.
Wood's Washer Co.	Washers	20, Temple Street, Liverpool	clxii.
Wratten & Wainwright	Plates, Paper, and Apparatus	38, Great Queen Street, London, W.C.	xxv. to xxviii.
Wray, W.	Lenses	North Hill, Highgate, London, N.	cl. and cli.

TO THE TRADE.

FERRO. PRUSSIATE

BLUE PRINTING

Photographic Paper

(SENSITIVE).

Requires no Toning or Fixing. Is simply Washed in Water after Printing, when the Prints are ready for Mounting.

NO CHEMICALS NECESSARY.

In Packets containing Twenty-five Sheets each: ¼-plate, 5in. × 4in., ½-plate; and in 1/1-plate packets of Twelve Sheets. Also in rolls of 32ft., 30in. and 40in. wide.

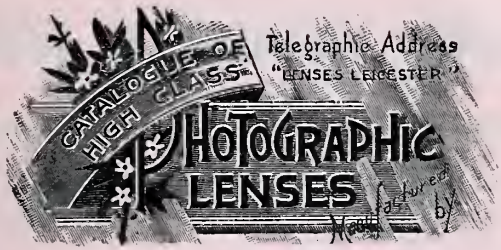
ATTRACTIVE SHOW CARDS SUPPLIED TO THE TRADE.

WHOLESALE FROM

MORISON BROTHERS,

99, BUCHANAN STREET,

GLASGOW.



Taylor, Taylor & Hobson

SLATE STREET WORKS,
LEICESTER.

AND

6, SOUTHAMPTON ST., HIGH HOLBORN,
LONDON.

LENSES FOR

FIXED FOCUS OR HAND CAMERAS

A SPECIALTY.

High-class Lantern Lenses.

SEND FOR

Our (9th Edition) Illustrated and Enlarged Catalogue, with Appendix on the Principles of a Lens Action.

TAYLOR, TAYLOR & HOBSON.

Our Lens Catalogue, which we mail free to anyone, contains the following instruments among others :—

RAPID RECTILINEAR LENSES	Code R R
MID ANGLE RECTILINEAR LENSES	„ M A R
WIDE ANGLE	„ W A R
RAPID VIEW	„ R V
WIDE ANGLE	„ W A V
RAPID PORTRAIT	„ E R R
LENSES FOR FIXED FOCUS OR HAND CAMERAS (A SPECIALTY)	D
LENSES FOR STEREOSCOPIC CAMERAS	S
PORTABLE CASKETS OF LENSES	„ CASKET
LAN ERN LENSES	L O

List of prices see opposite page.

Our lenses are fitted with the **SOCIETY STANDARD SCREWS** for Flanges.

The Lens Apertures also are arranged on the **SOCIETY'S UNIFORM SYSTEM.**

PORTABLE CASKETS made of any LENSES IN OUR LIST.

TAYLOR, TAYLOR & HOBSON.

TAYLOR, TAYLOR & HOBSON.

The following is a condensed List of Prices of the various General Lenses with Iris diaph.:

Full Catalogue mailed free on application.

Code.	4¼×3¼	6½×4¾	8×5	8½×6½	10×8	Pair for Stereo. (S.)
R R	£2 16 0	3 7 0	3 18 0	5 0 0	6 10 0	5 12 0
M A R	£3 10 0	3 17 0	4 8 0	5 10 0		6 18 0
W A R	£3 1 0	3 10 0		4 0 0	5 0 0	6 2 0
R V	£1 15 0	1 18 0	2 11 0	3 0 0	3 13 0	3 10 0
W A V	£2 1 0	2 16 0		3 10 0		4 2 0

PORTABLE CASKETS OF LENSES.

No.	Containing.	4¼×3¼	6½×4¾	8½×6½
1	R R & R V	£4 0 0	4 12 0	7 4 0
2	R R & W A R	£5 6 0	6 5 0	8 4 0
3	R R, W A R & R V	£6 4 0	7 5 0	10 4 0

LENSES FOR HAND CAMERAS.

	4-in. focus	5-in. focu	6-in. focus
Lens and Iris Diaph.	£3 7 0	3 17 0	3 17 0
With Rack and Pinion		4 15 0	4 15 0
Lens with Iris and Shew Shutter	£4 5 0	4 17 0	4 17 0
Lens & Wheel Diaph. f/8		2 10 0	

LANTERN LENSES, 6-in., £4 4s.; 8-in., £5 5s.; 10-in., £6 6s.; 12-in., £7 7s.

TAYLOR, TAYLOR & HOBSON.

Spirit Levels for Cameras

Secure Upright Views.
Prevent Distortion.

TAYLOR, TAYLOR & HOBSON.
Leicester. & 6. Southampton St. High Holborn, LONDON.



No. 1. 1 6
No. 2. 2 -



No. 1. Flush. 1/6.
No. 2. Flush. 2/-



No. 11. 1 9.
No. 12 2 3



No. 4. 3/-



B Finder. 5 -



C Finder. 5/-

TAYLOR, TAYLOR & HOBSON.

ADDENDA.

487.—Extra Light Tripod (Hinton & Co).

Considering the fact that this stand has legs 56 inches long, and yet weighs only 17 onnces, it is decidedly the most rigid one I have yet used, and should be good enough for any ¼, or even ½ plate camera of modern build. The legs, as will be seen by the illustration, are of the bowed shape,



No. 487.

and kept out in the centre by an ingenious brass hinged piece. The upper portion is kept rigid by means of stout cord. It is full outdoor height when in use, bnt folds into half the length for porterage. In the way of extra light stands it is a clever thing.

Price 16/-

488.—The "Climax" Plates (J. J. Griffin & Sons).

These are evidently of foreign make, but are sold in the usual English sizes by Messrs. Griffin & Sons. The trial I have made with them all confirm the opinion formed upon the development of the first one. They are exceedingly rapid, and yet give negatives more nearly approaching all the appearance of a wet plate than I have yet seen in any gelatino-bromide emnlsion, except with very slow landscape plates. Bnt even from these there is a difference, which is that the results are more delicate—or rather, that there is less difficulty in avoiding those great contrasts which were very unpleasant in the slow brands. They develop extremely rapidly, too, and give no false impression when viewed in the developing tray. Plates that

develop rapidly, as a rule, are not so dense when looked *through* as when judged by the surface. Slow developing plates, on the contrary, are often the reverse. But the "Climax" look the same either way, and this saves a good deal of lifting. The trials made were as follows:—

In the studio, light, dull middle day, two out of three blinds right down, ordinary portrait lens at f/8.

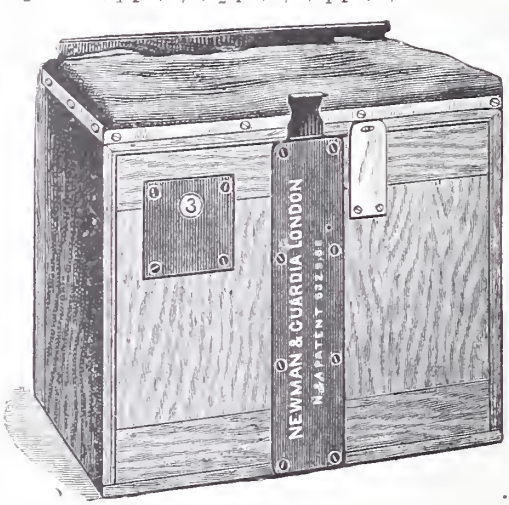
2 seconds, lady in red dress, too much.
$\frac{1}{2}$,, ,, ,, about right.
$\frac{1}{4}$,, gent smoking, quite good enough, too.

And in the hand camera, with a shutter said to work at the $\frac{1}{100}$th sec., but which I do not think exceeds $\frac{1}{50}$th, f/11, day bright but not sunny, very fine negatives indeed. The developer in this latter case was accelerated as usual. The developers used were—1st, the formula upon the box which is a pyro one—

	A.	
Pyro		100 grs.
Soda sulphite		2 oz.
Water		16 ,,
	B.	
Soda carbonate		1 oz.
Water		16 ,,

Equal parts being used. 2nd, a dry hydrokinone formula of moderate power, and 3rd, Fry's sulphoquinone. I confess that in my hands the latter worked best. As usual with foreign plates, they do not work very well with ammonia. The "Climax" plates, as I have said, give images nearly approaching in tone and vigour the old wet plates, yet combining extreme rapidity. They will certainly meet with favour, if as reliable and uniform as the batch I tried are good; moreover, they are extremely moderate in price, considering their rapidity.

Prices, per doz., $\frac{1}{4}$ pl., 1/-; $\frac{1}{2}$ pl., 2/3; $\frac{1}{1}$ pl., 4/3.



No. 489. Fig. 1.

489.—**"Changing Box"** (Newman & Guardia).

The improvements recently made to this well known bag principle changing box, are most important. The back of the box (fig. 1) now contains

all the moving mechanism, to which is added an index, automatically changing for every plate. There is, with this device, no liability to expose a plate twice or to change an unexposed plate, while the whole construction of the apparatus makes the rapid changing of the carriers, containing the plates or films, a matter of absolute ease and certainty. The index also allows any given plate to be exposed out of its turn at will.

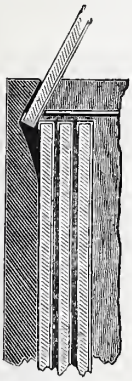


Fig. 2. No. 489. Fig 3.

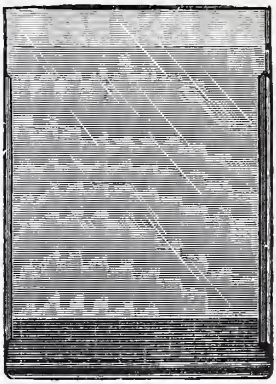


Fig. 2 is a section of the front showing carriers, and fig 3, the plate partly withdrawn from the carrier. It will be noted that the lifter is entirely a new design, and that the plates change from back to front. Altogether the box is made wonderfully easy and certain in its action.

Prices, which include carriers for one dozen plates and holders for one dozen films:—

Size.	Outside measurement.	Price each.
¼ pl.	$4\frac{7}{8} \times 4\frac{1}{2} \times 2\frac{1}{2}$	45/-
5 × 4	$5\frac{5}{8} \times 5\frac{1}{4} \times 2\frac{1}{2}$	55/-

Extra carriers or film holders—

Size.	1 dozen weighing	Per doz.
¼ pl.	5¼ oz.	4/-
5 × 4	7¼ ,,	5/-

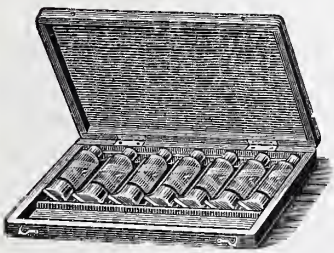


Fig. 1. No. 490. Fig. 2.

490.—"Glossy Colours" (Hinton & Co.)

A series of colours in tubes specially prepared for painting, spotting out, &c., upon the glazed surfaces of gelatino-chloride papers. The colours issued are—

1. White.
2. White Grey I.
3. White Grey II.
4. Re-touching I. (cold)
5. Re-touching II. (medium)
6. Retouching III. (warm)
7. Burnt Sienna.

From a brief trial of one of these, I think they will prove extremely usefnl. Fig. 2 shows the tube, and fig. 1 a case containing the series of seven.

Prices, per tube, 6d.; the case complete, 4/6.

491.—**Engraved Chemical Bottle** (Hinton & Co)

A very neat amber-coloured bottle with a large size ground label, which can be read in the dark room with the greatest ease.

492.—**Engraved Porcelain Trays** (Hinton & Co)

A tray of the usual type, but with a speciality of such words as "toning," "developing," "fixing," &c, impressed npon one end, the letters being filled in with black. This should prove much more serviceable than some of the lettered trays upon the market, as the lettering cannot be obliterated by use.

493.—**White Waterproofing Varnish** (Hinton & Co.)

The increase in the use of gelatino-chloride emulsion papers has necessitated several oddments. The above is a varnish which is applied to the back of the print by a brush to render it waterproof. In about three minutes it dries, and the print can then be mounted without the moisture of the mountant doing harm to the polished surface.

Prices—1/6 and 4/6.

494.—**Aristo Toning Bath** (Hinton & Co.)

This is not a combined toning and fixing bath, but a highly concentrated solution in two bottles for toning only. One part of No. 2 is mixed with 8 ounces of water, and then one part of No. 1 added carefully whilst the other is vigorously stirred. It tones very rapidly, and gives magnificent results of a purple black tone upon at least three brands of paper I tried. Its concentration makes it very handy.

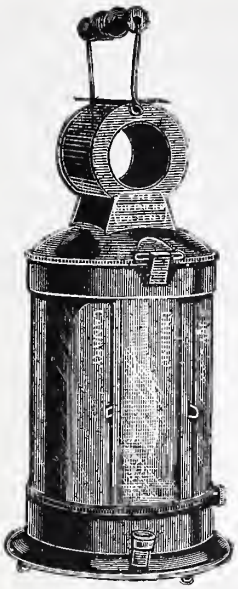
Prices—2/6 and 4/9.

495.—**New Hand Camera Lenses** (Swift & Son).

The firm are working ont a new series of lenses of 5, 5½, and 6 inch focus respectively, for use in hand cameras. The main features are to be a low price and a great reduction of weight. They will not work with a larger aperture than f/8. The combinations of this series are manufactured from some new glass recently introdnced by Dr. Schott. The sample sent me is only a rough and experimental one, and yet it is evident how neat and portable the series are going to be. The one sent, 5 inch equivalent focus, measures only ⅞ inch in diameter, including the brass work, and will not weigh very much over an ounce. It gives a good flat field and covers well. Altogether these lenses, when ready, should receive the attention of hand camera workers.

Price, with either Waterhouse or revolving stops,

5 and 5½ inch focus	£2	7	6
6 inch focus	£2	12	6



No. 496.

496.—The "Shepherd" Lamp (London & Paris Optic Co.)

A new form of lamp, fitted with a ground glass, front and sliding side pieces of ruby and yellow glasses, which can be shifted in a second, and are interchangeable. For travelling purposes these glasses can be removed and packed safely. It is fitted with a good ventilation shaft. The body is filled and the flame regulated from the outside. The illuminant is petroleum.

Price 15/6.



No. 497.

497.—**The "Shepherd" Changing Bag** (London and Paris Optic Co.)

A new pattern changing bag, which folds up into small compass, so that it can be readily carried in the pocket. At the side is a sheet of ruby glass let in, which gives sufficient light in the interior. It can be used for storing exposed plates, or focussing cloth as well.

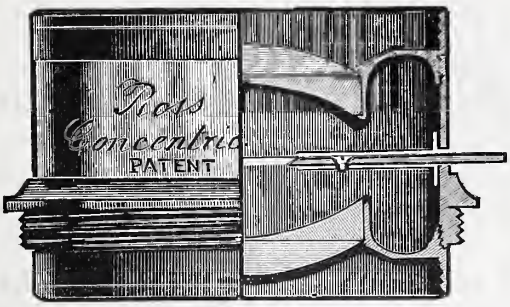
Prices, for plates up to ½ pl., 7/6 each; ¼ pl., 9/6.

498—**Film Carriers** (B. J. Edwards & Co.

These are quite new, and when fairly on the market will prove a boon to users of cut films. They are made out of one piece of light metal so turned over as to form a frame, in which is slipped a black card of the same size as the film. The groove is large enough to allow of the easy slipping in of the film, even in absolute darkness—a feature that some carriers certainly do not possess. When the film is half way in, the card is inserted, and the two pushed home together. I can testify with pleasure to the ease with which this is accomplished. The sheath is not solid, but is cut away in the centre, so that the spring of dark slide division presses directly upon the card and keeps the film strictly up to its correct position in absolute register. Another feature is that this aperture at the back is not rectangular, but the ends are of a wedge or V shape, which entirely prevents the film or card being caught by the edge.

499.—**New Metal Dark Slides** (B. J. Edwards & Co)

Another new thing that will surprise most photographic people. "Never prophesy unless you know" is a capital business maxim, and I intend to follow it out. I *know* these slides will "go," to use a trade term, and am not afraid to prophesy their success. They consist of a single piece of thin sheet metal, in which an aperture is cut of the required size. The slides and end are folded round something after the style of an envelope. This forms a rigid and compact case of the inner carrier or slide, which is much after the same pattern as the carrier before mentioned. But it differs in this respect, that the carrier is provided with a light-tight stop or cut off. A piece of metal is hinged to the frame by a strip of black velvet or other opaque material, so arranged that when in position it has a tendency to rise. The slide shutter is of thin tough mill-board, and draws right out, the aperture being closed by the hinged piece which rises of its own accord as soon as the shutter is withdrawn. I notice one neat little dodge, which is a strip of velvet across the bottom of the shutter inside. This clears the plate of dust when the shutter is withdrawn—it, in fact, makes a clean sweep. By the simplest imaginable process, the tag at the end of the shutter which is used in pulling it out, serves as a record and catch. By merely turning it under the metal body, it serves to show that the plate in that slide has been exposed and there is no chance of an accidental withdrawal. The total size of the slide is less than ⅛ of an inch larger all round than the plate, and is only about $\frac{3}{16}$ths of an inch thick. Of course an adaptor is needed to the camera, but this is simplicity itself, consisting of two plain brass strips, with a catch almost formed by the shape of the slide, which locks the slide in position. These slides can be entirely made by machinery. First a flat shaped piece of thin metal, and then the turning over and fitting. So that my readers will not be surprised to learn that the price will be about one-third of the cheapest mahogany slide. As to light-tightness, the model (and a rough one too) was in my hands for a week, and with a rapid plate in the brightest sunshine, no trace of light fog is obtainable. And I have done my best by twisting and turning the slide about. I have the misfortune to be a young man, but the study of apparatus has aged me considerably, and I know what I am talking about in saying that these new slides will attract attention.



No. 500.

500.—**The New Concentric Lenses** (Ross & Co.)

I cannot do better than quote the careful article of my former chief, Mr. Sturmey, as to this wonderful new series of lenses. He heads the article in question appropriately, "An Optical Startler." Mr. Sturmey is not such an amateur, even in optics, as some may deem him; and he certainly would not fly into raptures over a new lens unless there was occasion for it. Although I know it is perfectly out of place, yet as I have perfect freedom in all I write for this "Annual," a good opportunity should not be lost, I seize it to say that the said Sturmey knows a good thing photographic when he sees it. But now to these lenses themselves. In constructing photographic lenses for landscapes, architecture, copying and such like purposes, it has long been recognised that the symmetrical system affords the simplest way of obtaining rectilinear lines and eliminating coma, the errors in each half of the combination being of equal quantity and of opposite character, and it is for this reason that Messrs. Ross have for so many years adopted the symmetrical form of lens. Symmetrical lenses, however, of the ordinary type when corrected for the central pencils of light give roundness or curvature of field, and in order to obtain the necessary flatness requisite in photographic work, it is essential to separate the combinations, and thus lengthen the oblique pencils, this, however, introducing astigmatism instead of curvature of field. On the introduction of the new Schott Jena glass in 1886, Messrs. Ross foresaw the possibility of greatly improving photographic lenses, and arranged with their mathematician, Dr. Schroeder, who, we may here mention, is well known, both here and in America, as a practical and theoretical mathematician of great experience, to perfectly investigate the possibility of constructing a perfect lens, which should be free from roundness or curvature of the field, as well as astigmatism, distortion, coma, ghost and flare. The result of Dr. Schroeder's investigations and elaborate calculations, extending over several years, has been the production of an entirely novel symmetrical lens, which the firm are now introducing under the title of the "Concentric" lens. Its name is derived from the fact that it has concentric outside surfaces, which cause the central and all the oblique pencils of light to come to a focus on the same plane, thus entirely eliminating the defects incidental to lenses of ordinary construction. For the new "Concentric" lens Messrs. Ross & Co. claim a number of striking advantages. They claim, for instance, that the concentrics are the only lenses that give uniformly perfect definition over an absolutely flat field of a circle of about 75° in diameter. They also claim the lens to be perfectly free from astigmatism, distortion, coma, ghost and flare, and not only so, but that they are the only lenses which *are* so free. They further claim that their illuminating power is more uniform over the entire field than any other, the limitation of the field being sharply defined

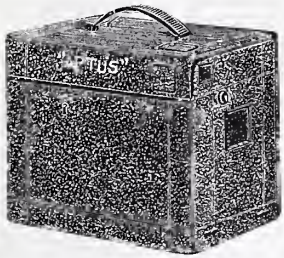
by the actual circle of light they give. They claim for them greater depth of focus at the same apertures than can be obtained by any other, and perfect definition with their full aperture of about f/20, the use of stops not being requisite to increase the marginal definition, the result being that pictures taken with them will bear high magnification, and may be enlarged without loss of detail in any part of the field. The "Concentric" lenses are constructed of special glass, which is colourless and almost free from secondary spectrum, and, as a consequence, the makers claim for them greater rapidity than ordinary lenses of equal aperture and focus. The "Concentric" lens brings every ray to absolute focus, therefore the same pluck and vigour is obtained over the whole field, which a single landscape lens gives over the centre only, yet the new lenses are entirely free from the distortion, marginal vignetting, and other defects inherent in single lenses. They differ from all other photographic lenses in that their various coloured images are of the same size, thus securing a more perfect rendering of the subject; and finally, Messrs. Ross claim for the new series of lenses that they are the only really novel form of lens introduced since the publication in 1843 of Petzval's equation for producing perfect lenses with absolutely flat fields. That those claims are borne out in practice the public will now have the opportunity of deciding for themselves, but we can say that so far as our own experience with the lens goes—and we have had one in use for at least ten days—it bears out every statement made by the manufacturers. The image is critically sharp, with an 8-inch lens, to the extreme limits of a 7½ x 5 plate, and it will cover an even larger plate than this with far less imperfect definition at the edges than any other lens we have ever tried. For architectural work, for copying engravings, pictures, and such like, and for work that requires critical sharpness, as well as for negatives taken specially with a view to subsequent enlargement, the new lens is undoubtedly the best we have yet had the pleasure of experimenting with. The "Concentric" lenses *actually do* cover with critical and minute sharpness to the uttermost corner the plate which they are sold to cover—a fact which will be largely appreciated by the public, lens makers hitherto having been perforce unable to fulfil the conditions requisite to ensure this degree of perfection. Messrs. Ross have had the new lens now completed some months, but on account of a difficulty in obtaining the peculiar quality of glass necessary for its construction, and because, having obtained it, it was necessary to submit it to various tests with a view to satisfying themselves of its permanent character, they have refrained from introducing it to the public until not only had they very fully satisfied themselves on this point, but also placed themselves in a position to supply the demand which they feel must necessarily ensue. In the direction of covering power, sharpness, and what is known as depth of focus, the new lens is undoubtedly away ahead of anything we have yet seen, and will assuredly create a considerable sensation in the photographic world.

Prices and details—

Size of plate.	Circle of light about 80 diameter.	Equivalent focus.	Price rotary stops.	Price Iris diaphragm.
3 × 3	5 inches	3 inches	£4 0 0	£4 10 0
4¼ × 3¼	6·7 ,,	4 ,,	4 0 0	4 10 0
5 × 4	8·4 ,,	5 ,,	5 0 0	5 10 0
6½ × 4¾	10 8 ,,	6 ,,	6 0 0	6 10 0
8 × 5	11·8 ,,	7 ,,	7 0 0	7 12 6
8½ × 6½	13·4 ,,	8 ,,	8 0 0	8 14 0
9 × 7	15 ,,	9 ,,	9 0 0	9 15 0
10 × 8	16 8 ,,	10 ,,	10 0 0	10 15 0
12 × 10	20 ,,	12 ,,	12 0 0	12 15 0
15 × 12	25 ,,	15 ,,	15 0 0	16 0 0
18 × 16	30 ,,	18 ,,	18 0 0	19 10 0

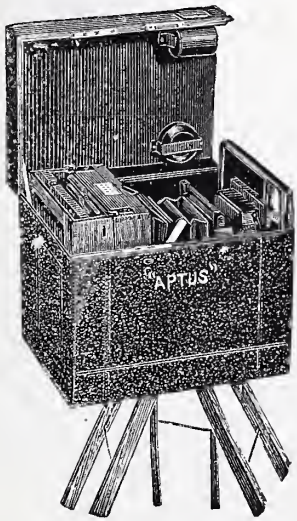
501.—**The "Aptus" Universal Hand Camera** (Sharp and Hitchmough).

This improved pattern upon the Universal principle has only just been brought out, and time enables me only to quote a description from the circular issued.



No. 501. Fig. 1.

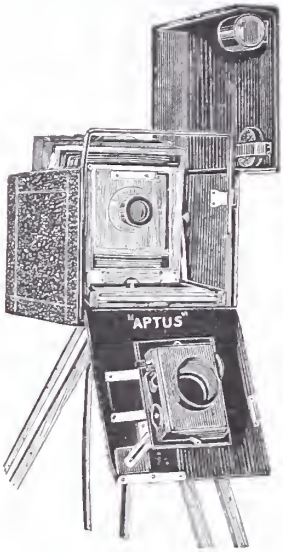
The woodcut fig. 1 represents the box containing the working parts as arranged for snapshot work. With one exception it is without projecting parts. The setting and release of the shutter, and in the case of a roll holder being used, all the manipulations are performed from the bottom, including the focussing, the winding of fresh tissue, and the indication of progressive number of exposures. The dimensions of a case containing a ¼-plate camera, fitted with Beck's 5in. R.R. lens and all the necessary attachments, are 8¾in. × 8in. × 7in., and turning the scale at 6lbs., and extending 13in. The outside measurement of a case for a 5 × 4 camera of a similar construction (which size is now the most popular) is 9¼in. × 8¾in. × 7¾in., turning the scale at 7lbs., and extending 14in.



No. 501. Fig. 2.

Fig. 2 shows the open case containing the camera, with lens and shutter complete, attached to tripod. With the camera in this position the swing back may be utilised by means of the lever just showing above the inner

edge of the box. By opening the aperture at the rear it allows the operator to compose and focus a picture on the ground glass; should, however, an interior picture be requred, it is necessary to remove the ordinary R R. lens, replacing it by one of a wider angle, and by letting down the front of the box, as shown in fig. 3, every advantage may be taken of the movements peculiar to this camera. As shown in the last woodcut, the wide angle lens is attached to the swing front ready for work; it will be perceived that the front of tbe camera is elevated, and the swing back brought into a perpendicular position to gain the object in view.

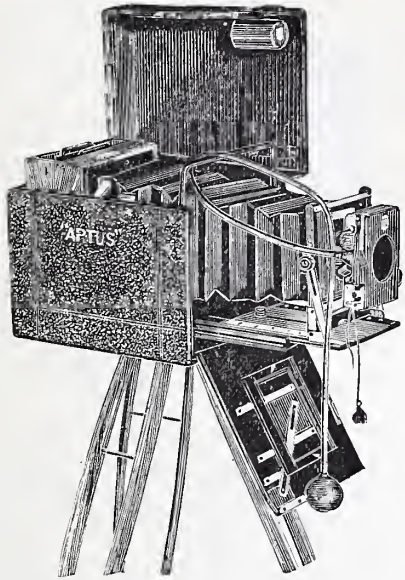


No. 501. Fig. 3.

The apparatus is called a hand camera, but the fact that it may be used, when desired, as a Detective (as shown in fig. 1) does not interfere with its free use on the tripod stand, as in fig. 2, when it is found necessary to use a long-focus landscape lens, or for architecture, when a wide-angle lens may be employed. The advantage of the swing back is maintained under all circumstances, as also the rising and falling front and rack and pinion adjustment. If so wished the camera can be removed from the box and used in the ordinary way, entirely dispensing with the outer case. By means of this automatic cut-off it is impossible to release the shutter for exposure until the image can be seen on the finder. The cut-off acts as a safeguard against exposing a plate by accident.

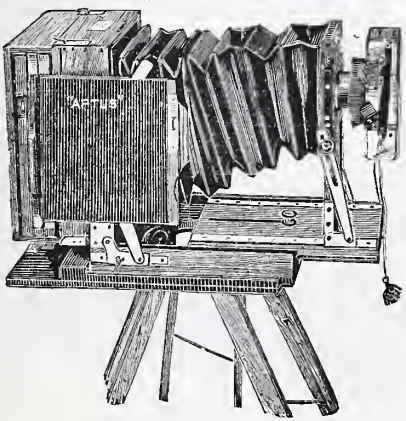
Fig. 4 shows the camera extended with triple extension (14 inches) for use with one combination of the R.R. or long-focus landscape lens, for distant objects, such as mountainous scenery and marine subjects. It will be noticed by the woodcut that the instantaneous shutter has been removed from its position on the let-down front, behind the automatic cut-off, and attached to the hood of the lens. The shutter is one of Thornton-Pickard's latest pattern, with all their latest improvements for time and instantaneous, speed indicator, and safety cut-off. The latter is an addition of great importance, especially when using a roll holder, the shutter of which being always drawn, it is necessary under ordinary circumstances to use a cut-off when re-setting the shutter-blind, but the safety blind working automatically

with the shutter obviates the possibility of admitting light to the camera by accident when re-setting the shutter. The exposure is made by pneumatic or trigger release. We will here point out the advantages of the revolving finder, the lens of which is of a bi-concave form, sufficiently deep in its curvature to produce a sharply defined and brilliantly illuminated reflected



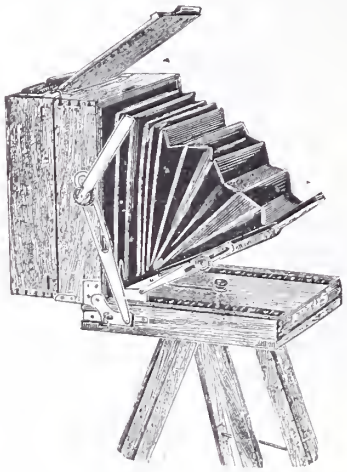
No. 501. Fig. 4.

picture on a small mirror, placed at an angle behind the lens. The lens used for the finder is selected so as to produce the same angle of view as the R.R. will do on the plate. The finder revolves for vertical and horizontal positions, thus doing away with extra weight, and reducing the number of apertures in the box.



No. 501. Fig. 5.

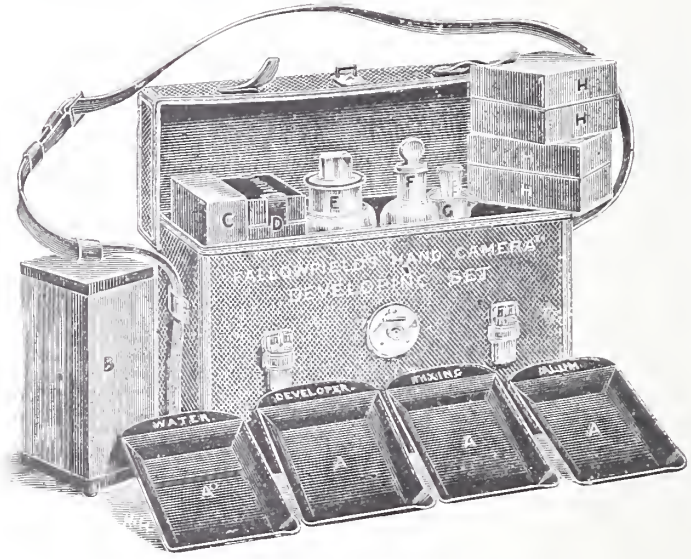
In fig. 5 the camera is represented with the back reversed for vertical pictures, and the front elevated so as to obtain less foreground. All the movements are clearly depicted.



No. 501. Fig. 6.

In fig. 6 the camera is shown unencumbered by the outer case and baseboard, so that it may be carried in a portable form, just as an ordinary Tourist Kinnear camera, deviating from the ordinary run of camera work.

Prices, ¼ pl., £10 10s; 5 × 4, £14 14s.



No. 502.

502.—**"Hand Camera Developing Set"** (J. Fallowfield).

A neat case of brown mail cloth, lined inside with green baize and containing the following:—

A—Four developing trays, each labelled as shown.
B—Folding ruby lamp.
C—Box to hold lamp when not in use.
D—Japanned tin case for alum.
E—Hyposulphite soda in handsome labelled bottle.
F—Hydroquinone developer.
G—Dropping bottle.
H—Four doz. ¼ Ilford (or any other make) dry plates and graduated measures.

It is intended for the development of hand camera or other ¼ plate negative when on tour, and includes everything necessary in a very small space indeed.

Price, with lock and key and shoulder strap, £2 2s.

503.—**Dibdin's Exposure Table** (Hazell, Watson & Viney).

It is made up of two cards fastened together by small paper fasteners in such a manner that one card slides over the face of the other. Upon the back is a table for light, arranged as sunlight, cloudy and gloomy, giving various ratios of light in the different months and at the different times of the day under these circumstances. On the back of this card is a table of fractions, arranged in vertical columns. The second card fits over this, and has a square cut out through which the fractions and figures are seen. At the top of this square, corresponding to the columns of figures, are the different stop numbers, and at the side the description of various classes of subject, arranged in line with the horizontal lines of the figures At the top are a series of figures which are seen through a circular hole in the card, these figures corresponding with the light table on the other side, so that all the photographer has to do is to find his light number, move his card until the figure corresponding appears through the central aperture, and run his eye down the column under the stop he is using until he reaches the figure on the line corresponding to the subject he is about to take. This gives him the exposure with plates of ordinary rapidity, his only calculation requisite, therefore, being to divide by two or three according as rapid or extra rapid plates are used

Price, 1/-; or in pocket case, 1/3.



No. 504

504.—**The "Facilus" Photo Clip** (W. S. Ward).

A very neat and useful clip for the display of mounted photographs, as will be seen by the illustration. It consists of a V-shaped wire with double

arms, the extremities of the V being turned over to hold the card. The clip is fastened to the face of the board or show case by a couple of screws, and the arms of the V drawn apart. The photo is then taken and placed against the clip at the angle and pressed upwards. This forces the two other ends together when the card may be dropped into the turned over ends, which, on the pressure being released, spread open, and at the same time decrease the distance between themselves and the other end of the clip, thus holding the photo firm.

Prices per doz.—Carte, 3/-; cabinet, 4/-; ¼ pl., 6/-; panel, 10/-

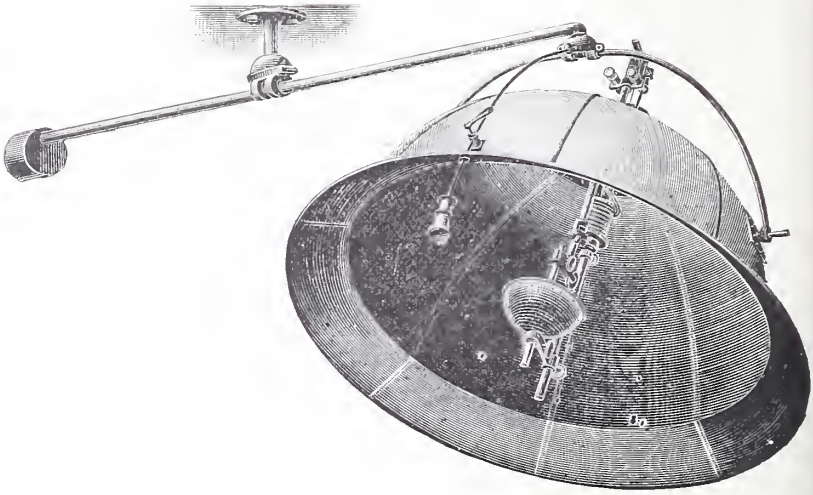
505.—**The "Eclipse" Changing Bag** (F. Beresford).

This was referred to on page 513, *Phot. An.* 1891. As before, it consists of a black bag of double thicknesses of light-tight material, provided with two armholes, through which the hands may be inserted into the interior, and the plates manipulated. The improvements for 1892 consist of the addition of three pockets on the inside. In the central one may be placed a brush for dusting the plates, a pencil for marking them, or any other requisite of this nature which may be deemed necessary, whilst by slipping the exposed plates into one pocket and the unexposed into the other, the operation of changing is made much more certain, and mistakes less liable to be made.

Prices—¼ pl., 7/6; ½ pl., 10/-; ¼ pl., 12/6.

506.—**Stretton's Cycle Carrier** (E. A. Stretton).

This is a simple contrivance for the carrying of photographic apparatus upon a cycle. It consists of a stout spring steel rod, which is so formed that it is attached to the machine by being hooked over and round the handle-bar and steering post. It forms a flat rest, upon which the outfit can be secured by a couple of straps, and has a sufficient amount of spring in itself to absorb the greater part of the vibration and all sharp jolts. It is very light, weighing but a few ounces, and for quarter-plate and other small light outfits will be found fully effective, reliable, and safe, whilst its price, too, is within the reach of everyone.



No. 507.

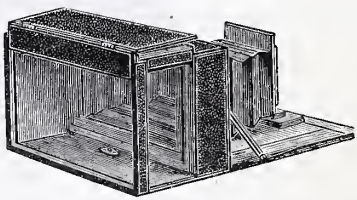
507.—**The "Pilsen" Electric Lamp** (Pilsen Electric Co.)

The demonstration at the Camera Club Conference has given an impetus to the electric light for studio work. This apparatus consists of a ball and socket suspension, a large reflector made of metal to give it strength, and a large current arc lamp ('Pilsen") specially constructed to feed at an angle. It has for its object the production of a perfectly diffused white light which shines on the sitter from one direction, this direction being adjusted by the operator, who can, with one hand, swing the suspensor and lamp round, or up and down, the lamp and reflector being balanced and fixed on universal joints

Electrical Particulars.—The standard size takes 55-45 amperes at 47-55 volts. The lower carbon is the positive, whose crater throws nearly all the light from the arc into the dead white surface of the 4'0" reflector, from which it is scattered on to the sitter. The carbons are 20mm. positive patent "Pilsen" carbon and 15mm. solid negative carbon. The carbon-holders are easily adjustable, and the lower one can be adjusted while the lamp is burning without any danger as regards shocks or sparks. The details of griping and adjusting the carbons have been carefully worked out, as on the true centring of the carbons depends largely the good burning of the lamp. In large current lamps, especially those at an angle, the shapes of the crater and point have a great deal to do with the noiseless and steady burning. The lamp, like all other lamps on incandescent circuits, has a resistance in series. These are made for 60-80 volt and 100-115 volt circuits, adjustable or not as required. Several of these lamps are burning on Supply Co.'s mains both in London and other cities, and others are fed by incandescent dynamos, either compound or shunt wound, driven direct by gas or steam engines.



Fig. 1.



No. 508. Fig. 2.

508.—**Shew's Universal Hand Camera** (Shew & Co.)

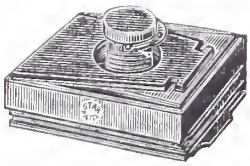
This was first shown at the 1891 Convention, and was constructed with the idea of allowing the owner to use glass plates, cut films, or the continuous rolls of film, at will, the back being so arranged that double backs for glasses or for film or roll holders, are interchangeable in one fitting, it is equally suitable for time or for hand exposures. It has a sliding door at the side to admit the roll holder or double back, which is entirely covered when in use, and another at the back to allow of focussing for time exposures. The front falls down with a spring action and forms the base on which the bellows extension is drawn, this is provided with a vertical and horizontal rising front and a rapid means of fixing at any point with a lever clamp, which also binds the travelling front to the base. The quarter-plate for pictures $4\frac{1}{4} \times 3\frac{1}{4}$, has a range or focus from $2\frac{1}{2}$ to $7\frac{1}{4}$ inches, and measures when closed, $7\frac{1}{4} \times 5\frac{3}{4} \times 5\frac{1}{2}$ inches.

The half-plate for pictures $6\frac{1}{2} \times 4\frac{3}{4}$, has a range of focus from 3 to $8\frac{1}{2}$ inches, and measures when closed, $9 \times 6 \times 7$ inches.

H H H

This camera is also made with telescopic bottom board for lenses of extreme length of focus for special purposes, with fine racking adjustment and range of focus from 3 inches to 9 inches for pictures $4\frac{1}{4} \times 3\frac{1}{4}$, and from $3\frac{1}{2}$ to 14 inches for pictures $6\frac{1}{2} \times 4\frac{3}{4}$.

Prices, with three double backs for plates or four for films, $\frac{1}{4}$ pl., £6 10s ; 5 × 4, £7 15s. Roll holders extra, 25/- and 28/6.

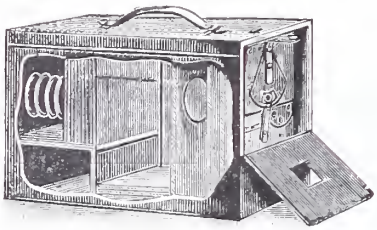


No. 509.

509. **The Guinea Pocket Camera** (Shew & Co.)

A camera to run upon the cheap line at the now popular price. It follows out the style of the well known "Eclipse," and measures $6\frac{1}{2} \times 4 \times 2$, so that it will go into the pocket. The weight is only 14 oz.

Price, with three double backs, lens and shutter, £1 1 0



No. 510.

510.—**The "Repeatograph" Hand-Camera** (Shew & Co.)

This is really the "Repeater," see page 332, *Phot. An.*, 1891, but the patent has now been purchased by the above firm. The improvements made over the one noticed last year are numerous, and one of the principal ones is a new design of sheaths which have now a recess for the plates. The movement of changing the plate and setting the shutter remains the same in principle, but is improved in detail, and the same applies to the magazine at the back, which was not very convenient to fill before. The measurements are $10 \times 7 \times 5$ inches, the camera weighs when loaded with plates 4lbs., and with films it is reduced to 3lbs.

Price £2 2s.

511.—**Large Plates and Foreign Sizes.**

In the prices for plates nothing beyond the 15×12 size has been quoted. As it may be useful to some to know the cost of larger sizes, and also those of foreign measurements, I quote from Messrs. Marion's price list as a sample for guidance.

			Ordinary.				Rapid.				Instantaneous.			
16	×	11	£0	18	6	per doz.	£1	3	6	per doz.	£1	9	0	per doz.
16	×	12	1	1	6	,,	1	7	0	,,	1	13	0	,,
16	×	13	1	2	0	,,	1	7	6	,,	1	15	0	,,
16	×	14	1	4	0	,,	1	10	0	,,	1	18	0	,,
17	×	11	1	2	0	,,	1	8	0	,,	1	18	0	,,
17	×	12	1	3	0	,,	1	9	0	,,	2	0	0	,,
17	×	13	1	4	0	,,	1	10	0	,,	2	2	0	,,
17	×	14	1	6	0	,,	1	13	0	,,	2	4	0	,,
18	×	16	1	17	0	,,	2	5	0	,,	2	13	0	,,
20	×	16	2	1	0	,,	2	9	0	,,	3	4	0	,,
24	×	18	2	11	0	,,	3	3	9	,,	3	17	0	,,

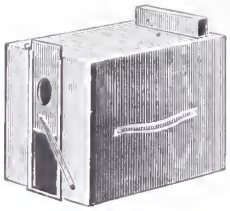
CENTIMETRE SIZES.

			Ordinary.				Rapid.				Instantaneous.			
9	×	12	£0	1	3	per doz.	£0	1	6	per doz.	£0	1	11	per doz.
11	×	15	0	2	2	,,	0	2	9	,,	0	3	3	,,
12	×	16½	0	2	3	,,	0	3	0	,,	0	3	5	,,
12	×	20	0	3	5	,,	0	4	6	,,	0	5	2	,,
13	×	18	0	2	6	,,	0	3	4	,,	0	3	9	,,
18	×	24	0	5	0	,,	0	6	8	,,	0	7	6	,,
21	×	27	0	9	0	,,	0	11	6	,,	0	13	6	,,
24	×	30	0	10	0	,,	0	13	0	,,	0	15	0	,,
26	×	32	0	13	6	,,	0	17	0	,,	1	0	3	,,
30	×	40	1	1	0	,,	1	5	0	,,	1	12	6	,,
50	×	60	4	0	0	,,	4	10	0	,,	6	0	0	,,

512.—**Short Film Spools** (THE EASTMAN CO.)

It is undoubtedly an advantage to be able to obtain short spools of film as well as those of 60 or 100 exposures, and the Eastman Co. are now issuing quite a comprehensive variety, as follows:—

	Exposures.	Price.
No. 1, Kodak Spools	24	2/6
	36	3/9
	48	5/-
	60	6/3
No. 2, Kodak Spools	24	4/3
	36	6/4
	48	8/6
No. 3, Junior Kodak Spools	12	2/-
	36	6/-
No. 3, Regular Kodak Spools	12	2/-
	36	6/-
No. 4, Junior and Folding Kodak Spools	12	3/3
No. 4, Junior and Folding Kodak Spools	36	9/9
No. 4, Regular Kodak Spools	12	3/3
	36	9/9
	60	16/-
4¾in. for 4¾ × 6½ Roll Holder	12	4/9
Daylight A	24	3/-
,, B	24	4/6
,, C	24	7/-
Ordinary A	24	2/9
,, B	24	4/3
,, C	24	6/3

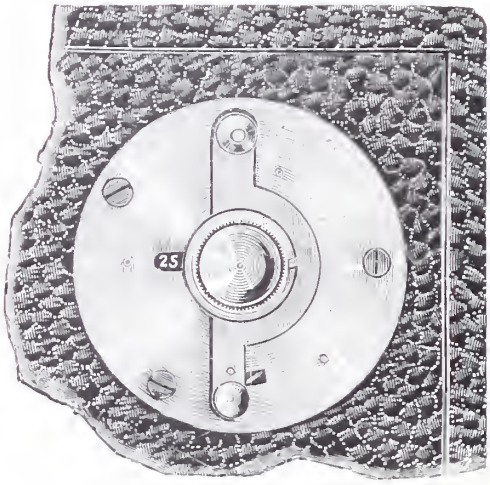


No 513.

513.—**The "Popular" Hand Camera** (Birmingham Photo Co.)

A compact and wonderfully cheap camera. The body is of wood, and weighs only 12 oz The dark slides are a combination of leather, cloth and cardboard, and are of a peculiar form. They much resemble the form of dark slide used in the "Artist" hand camera, except that they are for one plate only. The compartment for the plate is covered by a sliding cover, the plate being retained in its place by two folding edges. In use, the slide is inserted in a groove, a little bolt at the bottom of the camera is pushed home and catches into an eyelet let into the slide. The top is simply pulled up to expose the plate to the lens. Considering that the price is 6d. each, and that they only weigh 2 oz, they are very good. The camera has a drop shutter in front. Altogether it is a good thing for the money.

Price, with three dark slides, 7s. 6d.; *extras*, slides 6d. each.



No. 514. Fig. 1.

514.—**New "Kodaks"** (The Eastman Co.)

Notwithstanding the already great popularity of these well known hand-cameras, the new series, which though sold for some little time in America have only just been placed upon the English market, will, I am sure, meet with very great success.

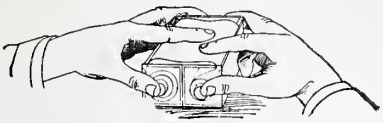
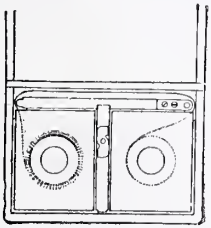


Fig. 2. No. 514.



Fig. 3.



No. 514. Fig. 4.

Briefly put, the two features are cheapness and the power o changing a roll in broad daylight. Each of these advantages must prove a sore temptation to the hand-camera worker. But for the fact that the firm have embraced the opportunity to introduce a cheap series, as well as the daylight patterns, my heading would have been the "Daylight Kodak." As it is, however, they are practically divided into two distinct styles, the "Ordinary" and the "Daylight," and thus they are listed. Dealing with the "Daylight" pattern first, the plan adopted is wonderfully simple. After all the exposures (24) have been made, the roll holder is removed from the back of the camera and the two square cardboard cases containing the spools are removed. The film emerges through a narrow slit, and at each end is a piece of black paper. This is cut, and then the end of the paper protruding from the fresh spool box is drawn over to meet the paper on the empty spool (as shown in fig. 2) and fastened together by moistening the gummed edge of the new spool. This is allowed to get dry and firm (4 or 5 minutes) and the spool boxes replaced in the holder, the new spool at the left (fig. 4) and the holder fastened on the camera. The key is then turned a certain number of times, to wind off the protecting black paper, and the camera is ready for another lot of exposures. It will be seen that each spool box is used twice. A new indicator is attached, which is pretty clearly shown in fig. 1. This serves the double purpose of recording the exposures made and preventing overwinding. Each time the lever is moved (fig. 3) the disc revolves bringing the next number in sight; this lever has a small tooth which catches in the revolving portion, when this check is removed the key can be turned and the film wound, and upon the completion of the change it falls automatically into position. The film cannot be overwound, as until the lever is again moved the key cannot be turned. There is neither calculation nor sight required, it works with perfect ease and certainty. Though perhaps not quite so suitable for the part development of a roll as the older pattern, yet it is not by any means a difficult matter. In my trials there was not time to wait for the whole 24 exposures, as this notice had to be written at the last moment almost. I found that the film moistened with the tongue gave a perfectly tight hold to the black paper, and it was done in a very few moments. Altogether this new daylight "Kodak" is a wonderful step in advance, and must still further increase the popularity of an already renowned camera. The "Ordinary" series are of cheaper make, though after the same style, but

finished in the natural wood (the "Daylight" are leather covered) and without the power of changing in daylight. They are, nevertheless, exceedingly cheap cameras. The other details vary considerably, so I give them in table form :—

The A "Daylight" has single lens, fixed stop, and requires no focussing.
" B " has double lens, revolving stops, and view finder.
" C " has double lens, revolving stops, adjustable speed to shutter, 2 view finders, and focussing lever and index.
The A "Ordinary" has single lens, fixed stop, and requires no focussing.
" B " has single lens, revolving stops, and view finder.
" C " has single lens, revolving stops, adjustable speed to shutter, 2 view finders, and focussing lever and index.

Prices—	A	B	C
	$3\frac{1}{4} \times 2\frac{3}{4}$	$4 \times 3\frac{1}{2}$	5×4
"Daylight"	£1 16 0	£3 5 0	£5 5 0
"Ordinary"	1 6 0	2 2 0	3 5 0

515.—**New Platinotype Paper** (Platinotype Co.)

Mr. Willis has succeeded in introducing a paper that is very much more simple to work. It is a distinct improvement over the hot bath process of former days, in that the temperature of the bath need not be above 50°, and also when one half of the print is developed first, the line between the two, when the second half is also developed, is not apparent. Although only introduced at the Camera Club Conference, the new paper has received unbounded praise.

Prices same as Hot Bath process.

516.—**The "Sandell" Plate** (Thomas & Co.)

Although by the time this work is in the hands of readers this new plate will be actually upon the market, at the date of writing this notice it is hardly so. I have, therefore, to fall back upon the description given by Mr. Sturmey in *Photography* :—"Quite a new idea is adopted in the "Sandell" plate. Tracing halation to its source, viz., the reflection from the glass or transparent support of the negative film, Mr. Sandell set himself to work to prevent halation by the interception of the light, or rather the prevention of reflections, and, arguing that an extremely slow emulsion does not show halation as a rule, he, by way of experiment, coated an ordinary lantern plate with a second coating of ordinary quick emulsion. From the result of this experiment the "Sandell" plate has been evolved, and consists of repeated coatings of emulsions of various degrees of rapidity, thus for very especial work where halation would be likely to make itself strongly apparent, a first coating is given to the plate of an emulsion registering five or six only on the sensitometer, succeeded by successive coatings of emulsions of higher rates of rapidity, and finishing with one of the greatest sensitiveness obtainable. It will thus be seen that the new plate is a combination of several. As it requires coating several times, it cannot necessarily be a "cheap" plate, but, of course, what our readers are mostly interested in is the question whether or not it does actually achieve the object aimed at. The action of the light on the new plate may be termed selective. If too great an exposure is given for the outer film the one next to it is impressed, and so on, and Messrs. Thomas assert, not without reason, that ordinary differences in exposure are fully compensated for. In proof of this they showed us quite a number of negatives in which halation was not present, but in which under ordinary circumstances we should have expected it to have been plainly apparent. Perhaps the most startling of these was one of a noonday sun, in which not only were the fine clouds with which the sky was covered plainly and well rendered, but the sun itself was clearly defined without halation. In another negative a mass of large leaved foliage occupied the immediate foreground to the left, whilst to the right a large expanse of open country stretched away, thus giving in

the one view open landscape and near dark foliage, a most difficult subject to deal with. Mr. Sandell had given 10 seconds' exposure, and the resulting negative showed the fullest detail in the foliage, and yet the extreme distance, and even the clouds, likewise clear and well defined, with no signs of halation or fog. By way of experiment, Mr. Sandell made a series of exposures upon the new plate, ourselves being the object photographed against a background of foliage, the light being strong and bright. With f/10 he gave an exposure on a "general" plate with the shutter about one-tenth of a second. This was followed by another exposure of the same length, and subsequently by exposures of ten, twenty, and forty seconds—the sun had gone in for this latter. The plates were developed two at a time, one of the shutter exposures being taken together with one of the longer ones, thus in one dish was developed with the same developer a shutter exposed plate and one having 40 seconds' exposure, and in another a shutter exposed plate and one having 20 seconds' exposure. Naturally the longer exposure came up first, but there was no extreme hurry about it. In the end the short exposure proved to be just about right. The longer exposure was so excessive that reversal had taken place in the sky and white cuffs, but no signs of halation were present. The image would naturally have been expected to have been a mere ghost This, however, was not the case. It certainly was flat and not the sort of negative one would aim to get, and it was veiled over completely. By the application, however, of a reducer, this veil was removed, and a flat though printable negative remained. Of course, this was an excessive test, such as under ordinary conditions of work would not exist. Mr. Sandell claims, therefore, that as few mistakes in exposure err more than two or three times, instead of 200 times as in this case, that with a normal developer good results can be got every time. As regards the rapidity of the plate, as we have before said, the outer coating is of the most sensitive emulsion made, and we were shown a large number of hand camera exposures which were all that could be wished. All new departures such as this are open to criticism, and the "Sandell" plate will doubtless be subjected to very strong criticism from rival plate makers and others, but although it can be asserted that development can be made to compensate for varying exposures, whatever it may do in the hands of experts it is comparatively a rare thing for the average worker to be able to do much in this line, especially the "one solution man," and in the new "Sandell" plate we undoubtedly have a distinct advance in this direction, and, so far as we could judge by the specimens shown and the optical illustration given us, the new plate fully bears out the claims its makers make for it.

Prices—	¼ pl.	½ pl.	¾ pl.	12 × 10
General ..	2/3 doz.	.. 4/9 doz.	.. 8/9 doz.	.. 21/- doz.
Especial ..	3/- ,,	.. 4/- half doz.	.. 6/6 half doz.	.. 14/6 half doz.

517.—**The "Cathcart" Plate** (Verel & Co.)

A very recent introduction. I have just been able to try one or two, and they are very good. The speed is moderate, and they develop rapidly, either with pyro soda, hydrokinone, or their own formula, which is :—

No. 1.

Ammon. liq.	3 drs.
,, brom.	60 grs.
Water	20 ozs.

No. 2.

Pyro	60 grs.
Soda, sulphite	90 grs.
Citric acid	12 grs.
Water	20 ozs.

Equal parts of these two are taken.

Prices—¼, 1/-; ½, 2/3; 1/1, 4/3; 12× 10, 10/6.

SOCIETIES.

Aylesbury Amateur Photo Society.

Formed June, 1888. Has headquarters at Victoria Club, and meets third Wednesday in month.

PRESIDENT—J. G. James, Esq.

HON. SECRETARY—J. F. Roche, 2, St. Mary's Square, Aylesbury.

East Southsea Photographic Society.

Formed October 17th, 1890, with headquarters at 135, Albert Road, Southsea, where it has dark and reading rooms, open from 10 a.m. to 11 p.m. Visitors are permitted to use the dark on payment of a small fee. Days of meeting, first Wednesday in month, with outing each month during summer.

PRESIDENT—Mr. J. Cleminson.

VICE-PRESIDENTS—Messrs. C. Boyle and J. Harding, V.C., R.N.

COUNCIL—Messrs. Gower, Lewis, Leigh, Musselbrook and Eyles.

HON. TREASURER AND SECRETARY—W. Mabb, Hatherleigh, Wyndcliffe Road, Southsea.

Edinburgh Photographic Society.

Established 1861. Meetings are held in the Society's Rooms, 38, Castle Street, on the first Wednesday of each month, from October to June inclusive. Saturday rambles are held once a month in summer. Besides the regular monthly meetings, the society gives "popular" evenings, at one of which the slides of members, for work done during the season, are shown. Each member also receives a "presentation print" each year.

PRESIDENT—Hippolyte J. Blanc, A.R.S.A., F.S.A.Scot.

VICE-PRESIDENTS—Dr. T. W. Drinkwater, F.C.S., and W. T. Bashford.

TREASURER—James McGlashan, 60, Dalry Road.

LIBRARIAN—Hugh Brebner.

COUNCIL—Jas. Crighton, J. Stewart Smith, J. M. Turnbull, Jas. Jameson, Hugh Auld, W.S., J. C. H. Balmain, Alex. A. Inglis, J. R. Roddick, Alex. Ayton, W. Brown, Thos. A. Croal, and Jas. Patrick.

SECRETARY—T. Barclay, 180, Dalkeith Road, Edinburgh.

Branch of the N.A.P.P.

Was formed April, 1891, has its headquarters at the Talbot Hotel, Sheffield, and meets first Tuesday in each month.

PRESIDENT—Mr. J. Crosby.

VICE-PRESIDENT—Mr. Dakin.

COUNCIL—Messrs. Ainley, Shingler, Langton, Whaley, Eddison, Leaman, and G. V. Yates.

HON. TREASURER—Mr. Dickinson.

HON. SECRETARY—Mr. A. E. Yates, Fargate, Sheffield.

Forfar Photographic Society.

This Society has been formed, with Mr. Fowler, Forfar, N.B., as secretary, but particulars are not yet to hand.

Goole Photographic Society.

Formed May, 1892, has a dark room at the Exchange, Goole. Rules and syllabus to be published later.

PRESIDENT—Robert Blair, M.D., J.P.

VICE-PRESIDENT.—T. C. Turton.

HON. SECRETARY—Samuel Wells, Airmyn, Goole.

The Photo Section of the Windsor and Eton Scientific Society is now amalgamated with Windsor and Eton Scientific Society. The headquarters of this Society are at the Albert Institute, Windsor.

Notts Camera Club has joined the Notts A.P.A.

The following societies which appeared in our last volume are either dead or appear to be so, as no information is obtainable after repeated application to the secretaries :—

Altrincham Amateur Photographic Society.
Batley and District Photographic Society.
Brockley and St. John's Scientific Society—Photographic Section.
Bury St. Edmund's Photographic Society.
Chelmsford Camera Club

Dover and East Kent Camera Club.
Enfield Camera Club.
Exeter Hall Camera Club.
Forest Hill Scientific and Microscopical Society.
Formby Camera.
Halifax Photographic Club.
Hyde Photographic Society.
Leith Photographic Lantern Club.
Liverpool University College Photographic Society.
Montrose Photographic Association.
Morley and District Amateur Photographic Society.
Newcastle (Staffordshire) and District Amateur Photographic Society.
Notts Camera Club.
Portsmouth Amateur Camera Club.
Postal Photographic Society.
Reading Amateur Photographic Society.
Rossendale Photographic Association.
Redcar and Coatham Amateur Photographic Association.
Shaftesbury Photographic Social.
Southport Photographic Society.
Shropshire Camera Club.
Woolwich and District Photographic Society.
Yorkshire College Photographic Club.

DARK ROOMS

Isle of Wight.

A—TOTLAND BAY HOTEL.

J. L & S. Opticians B

J. LANCASTER & SON

1892.

CATALOGUE

OF

APPARATUS FOR

Dry Plate Photography

MESSRS. J. LANCASTER & SON

CAUTION BUYERS against Spurious Imitations of their well-known APPARATUS. Their REGISTERED TRADE MARK is upon every Camera, Slide, Lens, Stand, &c., sent out by them, and is a guarantee of good quality. They are determined to send out only goods of the best possible quality, and to retain that confidence which has been so liberally bestowed upon them. They would ask purchasers to see that every Article is stamped with their Trade Mark, as in many cases they have found that their Cameras have been sold with most inferior Slides, and that their Lenses have been put into Cameras of a very common type and sold as their Sets.

Messrs. J. L. & S. would call special attention to a method of deception that prevails largely, that is, to put a common French Rectilinear or a single lens on one of their Cameras, advertise as Lancaster's Cameras, &c, at a large discount off Makers' prices. They do not supply any but legitimate members of the trade, and warn Buyers against being taken in by these deluding advertisers.

INFRINGEMENTS WILL BE PROSECUTED.

THE WORLD-WIDE POPULARITY OF

J. LANCASTER & SON'S CAMERAS

Is proved from the figures below, giving the names and numbers of apparatus used by competitors in four Amateur Photographic Competitions, held recently, and published in Photographic Newspapers—

LANCASTER'S APPARATUS ...	**144**	Rouch	4
Dallmeyer	34	Kodak	2
Beck	28	Morley	2
Watson	10	Thomas	2
Underwood	7	Noakes	1
Voigtlander	6	Sands and Hunter...	1

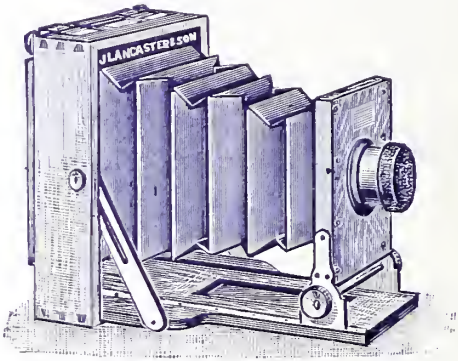
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

The 1892 "Merveilleux" Patent

THIS is a capital Camera, made of Mahogany, with bellows-body which makes the Camera very portable. The Focussing Slide is hinged, and folds over Camera. The slide reverses in an instant, so that a vertical or horizontal photo can be taken without moving any part of the Camera.

Light, Strong, Durable.
A most Compact Apparatus.



No Loose Parts.
Opened and Closed in an instant.

The Lens is a meniscus achromatic one, giving excellent depth, and covering the plate all over from corner to corner. With this apparatus there is a portable Camera Stand and Brass Top, and when the price is considered, it is, without exaggeration, the most marvellous Camera made.

Each Set consists of Camera, Double Dry Slide, Lens, and Stand.

300	"Le Merveilleux," for ¼ plate	£1 1 0
302	,, ,, ½ plate	2 2 0
304	,, ,, ¼ plate	3 3 0
305	,, ,, 10 × 8 plate	4 4 0
306	,, ,, 12 × 10 plate	5 5 0
307	,, ,, 15 × 12 plate	6 6 0

COMPLETE SETS FOR TAKING NEGATIVES.

Consisting of Camera, Double Dry Slide, Lens and Stand, one dozen Dry Plates, Developing and Fixing Dishes, Developing and Fixing Solutions, Ruby Lamp, and Book of Instructions.

	¼ pl.	½ pl.	¼ pl.	10 × 8	12 × 10
Complete Sets ..	1 7 6	2 12 6	3 15 0	5 5 0	6 15 0
Extra Slides ..	0 5 6	0 10 6	0 18 0	1 5 0	1 15 0
Printing Materials	0 5 0	0 10 6	0 15 0	1 1 0	1 5 0

COLMORE ROW, BIRMINGHAM.

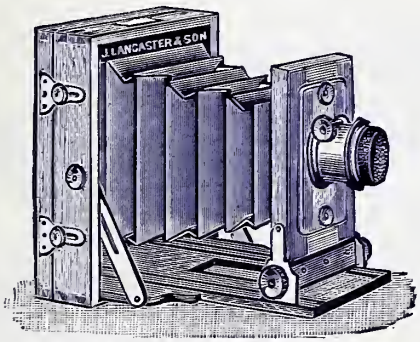
J. LANCASTER & SON,

—* THE *—

1892 "Le Meritoire" Patent

WHAT has been said about Le Merveilleux applies here also, with this difference, that the Lens is a selected one, and is mounted in rackwork. The Camera also has a Double Swing Back—vertical, horizontal, and corner swing being obtained. The slide reverses in an instant from vertical to horizontal without moving any part of Camera. The Stand belonging to LE MERITOIRE is an excellent one.

Double Swing Patent Universal Front.



Very Light and Portable. No Loose Parts.

☞ The Swing Back is most essential when the Camera is required for Architectural work, and also the Rising Fronts are indispensable for the same kind of work—in fact, it is impossible to get true architectural lines unless we have both the Swing Back and Rising Front.

Each Set consists of Camera, Double Dry Slide, Lens, and Stand.

310	"Le Meritoire" for ¼ plates	£1 11 6
312	,, ,, ,, ½ plates	3 3 0
314	,, ,, ,, 1 plates	4 10 0
315	,, ,, ,, 10 × 8 plates	6 0 0
316	,, ,, ,, 12 × 10 plates	7 10 0
317	,, ,, ,, 15 × 12 plates	8 10 0

COMPLETE SETS FOR TAKING NEGATIVES,

Consisting of Camera, Double Slide, Lens and Stand, one dozen Dry Plates, Developing and Fixing Solutions, Dishes, Ruby Lamp, and Book of Instructions.

	¼ pl.	½ pl.	1 pl.	10×8	12×10
Complete Sets	1 17 6	3 15 0	5 10 0	7 0 0	9 0 0
Extra Slides	0 5 6	0 10 6	0 18 0	1 5 0	1 15 0
Printing Set	0 5 0	0 10 6	0 15 0	1 1 0	1 5 0

COLMORE ROW, BIRMINGHAM.

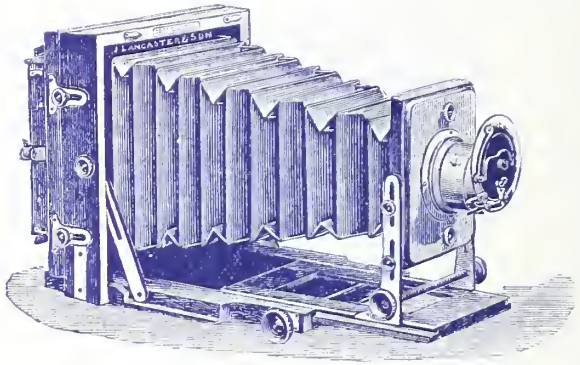
J. LANCASTER & SON,

The 1892 "Instantograph."

(PATENT.)

THIS Apparatus is useful for all kinds of work, Instantaneous Pictures of Moving Objects, Portraits, Groups, Landscapes, Architectural and Engineering Subjects, etc., etc. The Lens is of a most rapid type, and has our Patent Instantaneous Shutter working with the greatest rapidity, also our Patent Adjustable Diaphragms showing at a glance the aperture and relative length of exposure.

Universal Opinion!



"Everything an Amateur can desire."

WILL TAKE VERTICAL OR HORIZONTAL PHOTOS.

The Camera is beautifully made, and folds up into the smallest possible compass. The Tail Board opens out of Camera and the Lens Front slides out and clamps. Fine adjustment is obtained by Rack Work. The Bellows in THE INSTANTOGRAPH are made of leather, and the apparatus, of which, by the way, over 30 000 have been sold, is pronounced the *sine quâ non* of the Amateur Photographer. The Stand is of polished mahogany with a brass top.

Each Set consists of Camera, Slide, Lens and Stand.

320	Price complete for ¼ plate	£2	2 0
322	,, ,, ½ plate	4	4 0
324	,, ,, ¼ plate	6	6 0
325	,, ,, 10 x 8 plate	8	8 0
326	,, ,, 12 x 10 plate	10	10 0
327	,, ,, 15 x 12 plate	12	12 0

EXTRA SLIDES.

		¼	½	¼	10 x 8	12 x 10	15 x 12
328	Double Dry Slides ...	7 6	12 6	20 -	28 -	40 -	45 -
329	Wet Plate ,, ...	6 -	11 -	17 6	24 -	34 -	38 -
	Carriers		1 6	2 6	3 -	3 6	4 -

The Carriers hold two plates, and are sent out to hold the next size smaller plate, thus the ¼ plate carrier at 1.6 holds two ½ plates, the ½ plate holds two ¼ plates, and so on; but carriers may be had for any of the smaller sized plates at the above prices.

If with Rectigraph Lens and Shutter in place of Instantaneous Lens and Shutter, EXTRA COST.

½	¼	¼	10 x 8	12 x 10
£1 2 6	£1 17 6	£2 7 6	£2 17 6	£3 15 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

• • • THE 1892 • • •

"INSTANTOGRAPH" SETS.

(PATENT.)

COMPLETE SETS FOR TAKING NEGATIVES. (A)

EACH SET consists of Camera, with Leather Bellows, Universal Front, Double Swing Back, Rising Front, Best Instantaneous Lens with Patent Shutter, Mahogany Camera Stand, one dozen Instantaneous Plates, Developing and Fixing Solutions, Developing and Fixing Dishes, Ruby Lamp, and Book of Instructions.

320A	No. 320, with Chemicals, &c., as above	£2 8 6
322A	,, 322, ,, ,, ...	4 16 6
324A	,, 324, ,, ,, ...	7 6 0
325A	,, 325, ,, ,, ...	9 15 0
326A	,, 326, ,, ,, ...	12 0 0

COMPLETE SETS FOR NEGATIVES AND PRINTS. (B)

THESE SETS, in addition to above, contain every requisite for Paper Printing, including Sensitised Paper, Toning and Fixing Solutions, Toning and Fixing Dishes, Printing Frame, Cards, Cutting Shape, and Book of Instructions.

320B	No. 320, and Chemicals, &c., as above	£2 13 6
322B	,, 322 ,, ,, ...	5 7 0
324B	,, 324, ,, ,, ...	8 1 0
325B	,, 325, ,, ,, ...	10 16 0
326B	,, 326, ,, ,, ...	13 5 0

COMPLETE OUTFIT FOR NEGATIVES, PRINTS, &c. (C)

THESE SETS consist of Camera, Lens, Stand, three Double Dry Slides, two dozen Plates, Ruby Lamp, six Dishes, Printing Frames, Scales and Weights, Sensitised Paper, large stock of Chemicals, Vignette and Cutting Glasses, Measures, Plate Box, Compound Focusser, &c., in Polished Cabinets.

320C	Complete Outfit, ¼ plate	£4 4 0
322C	,, ½ ,, ...	7 7 0
324C	,, 1 ,, ...	10 10 0
325C	,, 10 x 8 plate	14 14 0
326C	,, 12 x 10 ,, ...	20 0 0

If with Rectigraph Lens and Shutter, in place of Instantaneous Lens and Shutter—Extra Cost.

¼	½	1	10 x 8	12 x 10	15 x 12
£1 2 6	£1 17 6	£2 7 6	£2 17 6	£3 15 0	£4 10 0

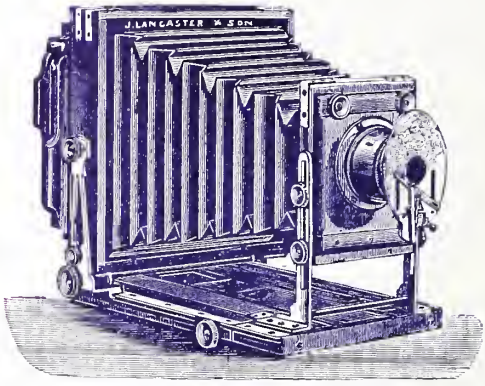
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

THE 1892 SPECIAL

Brass-bound Instantograph.

(PATENT.)



THIS Apparatus combines the Instantograph and the International, and while being exceedingly compact, yet at the same time possesses a longer extension than the ordinary Instantograph. The Tail Board folds over and protects the Focussing Glass. The Lens is a selected one and has our new patent See-saw Shutter. A Mahogany Stand with brass top goes with each set, and one Brass-bound Double Slide.

Each Set consists of Camera, Slide, Lens, and Stand.

320 S	Price complete for ¼ plate	£2	10 0
322 „	„ „ ½ plate	5	0 0
324 „	„ „ ¼ plate	7	10 0
325 „	„ „ 10 x 8 plate	9	9 0
326 „	„ „ 12 x 10 plate...	11	11 0
327 „	„ „ 15 x 12 plate	13	13 0

EXTRA BRASS-BOUND SLIDES.

		¼	½	¼	10 x 8	12 x 10	15 x 12
328 S	Double Dry Slides ...	9/6	14/6	23/-	30/-	42/-	50 -
329 „	Wet Plate...	8/6	13/-	19/-	25/-	40/-	45/-
	Carrlers		1/6	2/6	3/-	3/6	4/-

If with Rectigraph Lens and Shutter in place of Instantaneous Lens and Shutter.

¼	½	¼	10 x 8	12 x 10
£3 12 6	£6 17 6	£9 17 6	£12 6 6	£15 6 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

THE 1892

Special Brass Bound "Instantograph" Sets.

(PATENT.)

COMPLETE SETS FOR TAKING NEGATIVES. (A)

EACH SET consists of Camera, with Leather Bellows, Double Swing Back, Best Instantaneous Lens, with Patent See-saw Shutter, Mahogany Camera Stand, one dozen Instantaneous Plates, Developing and Fixing Solutions, Developing and Fixing Dishes, Ruby Lamp, and Book of Instructions.

320 S A	No. S 320, with Chemicals, &c., as above	£2	16	6
322 S A	,, S 322, ,, ,, ,, ...	5	12	6
324 S A	,, S 324, ,, ,, ,, ...	8	8	0
325 S A	,, S 325, ,, ,, ,, ...	10	16	0
326 S A	,, S 326, ,, ,, ,, ...	13	1	0

COMPLETE SETS FOR NEGATIVES AND PRINTS. (B)

THESE SETS, in addition to above, contain every requisite for Paper Printing, including Sensitised Paper, Toning and Fixing Solutions, Toning and Fixing Dishes, Printing Frame, Cards, Cutting Shape, and Book of Instructions.

320 S B	No. S 320, and Chemicals, &c., as above	£3	1	0
322 S B	,, S 322, ,, ,, ,, ...	6	3	0
324 S B	,, S 324, ,, ,, ,, ...	9	2	0
325 S B	,, S 325, ,, ,, ,, ...	11	17	0
326 S B	,, S 326, ,, ,, ,, ...	14	6	6

COMPLETE OUTFITS FOR NEGATIVES, PRINTS, &C. (C)

THESE SETS consist of the Camera, Lens, Stand, 3 Double Dry Slides, 2 dozen Plates, Ruby Lamp, 6 Dishes, Printing Frames, Scales and Weights, Sensitised Paper, large stock of Chemicals, Vignette and Cutting Glasses, Measures, Plate Box, Compound Focusser, &c., in Polished Cabinet.

320 S C	Complete Outfit, ¼ plate	£4	12	0
322 S C	,, ,, ½ ,, ...	8	5	0
324 S C	,, ,, 1/1 ,, ...	11	11	0
325 S C	,, ,, 10X 8 ,, ...	15	15	0
326 S C	,, ,, 12X10 ,, ...	21	0	0

COLMORE ROW, BIRMINGHAM.

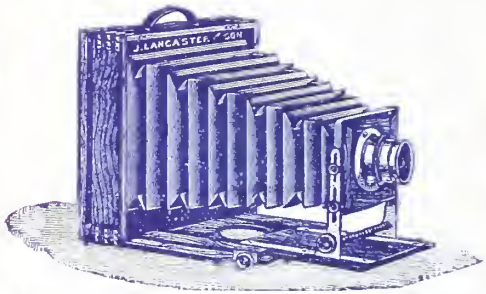
J. LANCASTER & SON,

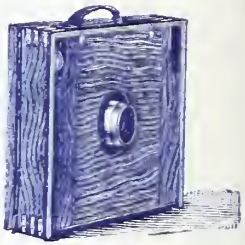
THE 1892

Pocket Instantograph

(Patent).

MOUNTED IN ALUMINIUM OR IN BRASS.





THIS is a portable form of Instantograph, excessively light, weighing only a few ounces, but at the same time very firm; it has Aluminium Binding, Runners, Front Stage, &c.

The Lens is very rapid, and is mounted in Aluminium, and has a patent Aluminium Shutter working at high speed at time or will.

The Stand is a new pattern, with Aluminium top and fittings, and is the lightest and most portable stand made.



The Camera, Lens, Shutter and three Double Dry Slides are carried in a Leather Case with lock and key, and form altogether a most beautiful set.

The Double Slides, ¼ plate, weigh two ounces each, and three are included in each set.

	¼	½	1/1
Pocket Instantograph, including Camera, Lens, Shutter, Three Aluminium Bound Slides, Leather Case, and Aluminium Mounted Stand	84/-	147/-	203/-
Ditto ditto Brass instead of Aluminium	70/-	130/-	180/-
Ditto ditto with Rectigraph Lens, mounted in Aluminium...	105/-	200/-	270/-
Ditto ditto Brass instead of Aluminium	90/-	180/-	250/-

COLMORE ROW, BIRMINGHAM.

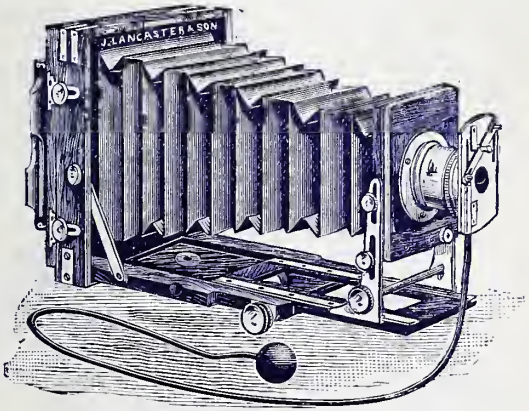
J. LANCASTER & SON,

THE 1892

Aluminium Mounted Instantograph.

This Apparatus is about as perfect, portable and light, as it is possible to make one.

THE AMATEUR'S DELIGHT.



CONSTANT COMPANION.

THE Camera is made out of selected Mahogany, of the smallest possible size, with a due regard to strength. It has Aluminium Binding, Aluminium Front Stage, Plates, Screws, &c., so that the Camera is the Lightest Bound Camera ever made—when it is taken into account that the Camera has Rising Front, Double Swing Back, Long Extension Reversing Back, and all recent improvements.

The Lens is a specially selected one, mounted in Aluminium, and has our Patent Aluminium See-saw Shutter.

The Stand has an Aluminium Top, and the whole apparatus is perfect and complete.

	¼	½	1/1
Camera, Slide, Lens, and Stand ..	£3 3 0	£5 10 0	£8 0 0
Extra Slides, Aluminium Bound ..	0 10 0	0 15 0	1 5 0
Sets of Chemicals for Negatives and Prints, &c.	0 12 6	1 5 0	1 15 0

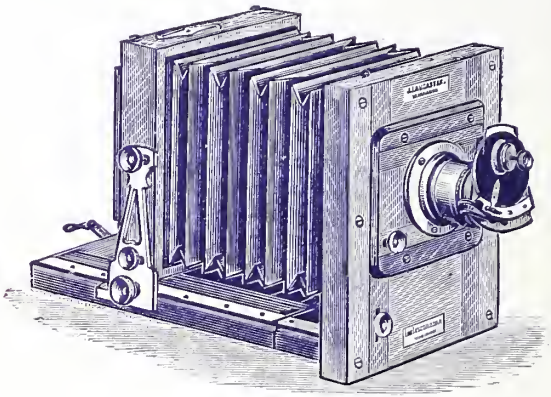
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

—THE—

1892 International Patent

THIS is an excellent apparatus, and is very compact, closing in to about two inches and opening out to nearly three times the greatest length of Plate. It has a Folding Tail Board, Lancaster's Patent Reversing Frame and Slide Holder, Swing Back, &c. The Lens is an Instantaneous one, with Patent Shutter and Patent Diaphragms, giving any aperture that may be required, and showing at a glance the diameter of Stop, ratio of aperture to focus, and speed of same. Mahogany Stand with Brass Top.



THE 1892 INTERNATIONAL is a Camera which has given great satisfaction; it is strongly built, well put together, and is a great improvement on the original pattern. It has Double Swing Back, Brass Runners on Tailboard, and in every way is a Perfect Apparatus.

330	Price Complete			¼ (4¼×3¼)	£2 10 0
332	,, ,, ...			½ (6½×4¾)	5 0 0
334	,, ,, ...			1 (8½×6½)	7 10 0
335	,, ,, ...			10× 8	9 9 0
336	,, ,, ...			12×10	11 11 0
337	,, ,, ...			15×12	13 13 0
330A	Fitted with Rectigraph Lens and New Patent Shutter, in place of Instantaneous Lens and Shutter,			¼ (4¼×3¼)	£3 12 6
332A	Ditto	do.	do.	½ (6½×4¾)	6 17 6
334A	Ditto	do.	do.	1 (8½×6½)	9 17 6
335A	Ditto	do.	do.	10× 8	12 5 0
336A	Ditto	do.	do.	12×10	15 0 0
337A	Ditto	do.	do.	15×12	17 10 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

"INTERNATIONAL" SETS.

Complete Set for taking Negatives and Prints.

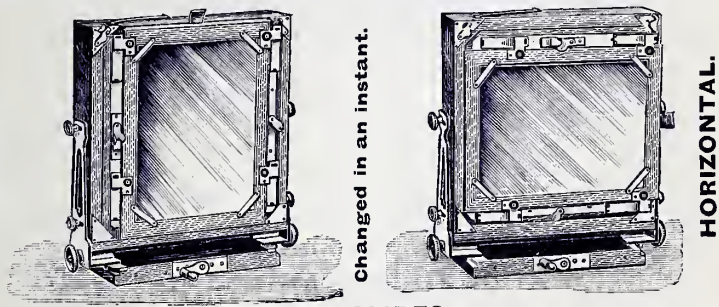
EACH Set consists of Camera, Double Slide, Lens and Stand, Dry Plates, Developing and Fixing Solutions, Developing and Fixing Dishes, Ruby Lamp, Sensitised Paper, Printing Frame, Cards, Cutting Shape, Toning and Fixing Solutions, Ebonite and Porcelain Dishes, and Book of Instructions.

330C	COMPLETE SETS:—Camera, Lens, Stand, Chemicals, Plates, Dishes, Printing Frame, Sensitised Paper, Ruby Lamp, &c., ¼ (4¼×3¼)				£3 1 6
332C	Ditto,	do.	do.	½ (6½×4¾)	6 3 0
334C	Ditto,	do.	do.	1/1 (8½×6½)	9 5 0
335C	Ditto,	do.	do.	10×8	11 17 0
336C	Ditto,	do.	do.	12×10	14 11 0
37C	Ditto,	do.	do.	15×12	17 8 0

COMPLETE SETS AS ABOVE, WITH RECTIGRAPH LENS AND PATENT SEE-SAW SHUTTER.

¼	½	1/1	10×8	12×10	15×12
£4 4 0	£8 0 0	£11 11 0	£14 14 0	£18 5 0	£22 0 0

THE INTERNATIONAL CAMERA has every motion, Lancaster's Patent Reversing Back, Extension Bellows, Folding Tail-board of excellent design. The whole unpacks and repacks in an instant.



EXTRA SLIDES.

	¼	½	1/1	10×8	12×10	15×12
Double Dry	7/6	12/6	20/-	28/-	40/-	45/-
Carriers		1/6	2/6	3/-	3/6	4/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

LANCASTER'S

"Improved Special '86" Camera

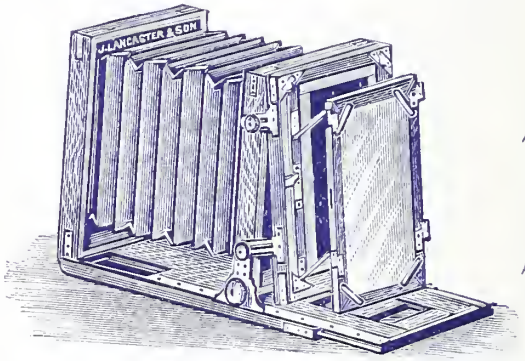
(PATENT).

DOUBLE EXTENSION. VERY PORTABLE. BRASS BOUND.
DOUBLE SWING UNIVERSAL MOVING FRONT.

BEST QUALITY BRASS-BOUND FOLDING CAMERA, extending to twice the ordinary length, with Rackwork Adjustment, best Leather Bellows, Reversing Frame, Rising Fronts. The focussing Slide moves in a Lateral direction, and the Dark Slide, instead of sliding in the usual way, is simply grooved to go on to a brass plate, and a movable plate in back of Camera fixes the Dark Slide in an instant.

EACH CAMERA HAS DOUBLE SWING.

REVERSING BACK. EVERY RECENT IMPROVEMENT



RACK ADJUSTMENT

SLIDING ADJUSTMENT

CAMERA AND ONE BRASS-BOUND SLIDE.

338 ¼	339 ½	340 1/1	341 10 × 8	342 12 × 10	343 15 × 12
£2 10 0	£4 0 0	£5 0 0	£6 0 0	£7 0 0	£8 8 0

EXTRA DARK SLIDES.

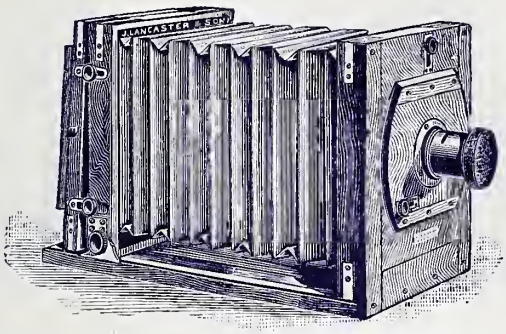
	¼	½	1/1	10 × 8	12 × 10	15 × 12
Double Dry	12/6	17/6	25/-	30 -	42/-	50/-
Wet	10/-	15/-	21/-	25/-	40/-	45/-
Carriers		1/6	2/6	3/-	3/6	4/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

Lancaster's Improved Special 1886 Sets

Rapid Rectigraph Lens in B and C Sets.



Very Light, Strong, and Portable.

FIRST QUALITY SETS.

LANCASTER'S SPECIAL 1886 CAMERA, Brass Bound, Double Dry Slide, Instantaneous Lens with Patent Adjustable Diaphragms, Instantaneous Shutter, and best Mahogany Folding Stand, &c

¼ 338A	½ 339A	1/1 340A	10×8 341A	12×10 342A
£4 0 0	£6 0 0	£8 0 0	£10 0 0	£12 12 0

LANCASTER'S PATENT CAMERA, &c., &c., as above, but having Rectigraph Lens, and Lancaster's Patent "See-saw" Shutter in place of Instantaneous Lens and Shutter. This is a perfect Camera and Lens.

¼ 338B	½ 339B	1/1 340B	10×8 341B	12×10 342B
£5 0 0	£7 10 0	£10 0 0	£12 12 0	£15 0 0

FIRST QUALITY COMPLETE SETS,

INCLUDING

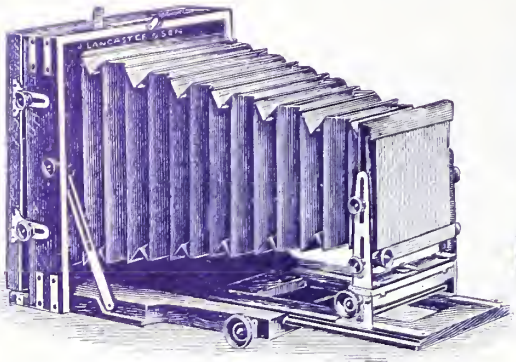
LANCASTER'S PATENT CAMERA, Double Swing, &c., &c., three Brass-bound Double Dry Slides, best Camera Stand, Rectigraph Lens, best Leather Case for Camera, Lens, Instantaneous Shutter and three Slides, Lancaster's Patent Ruby Lamp, three Ebonite Dishes, Plates, Scales and Weights, Measures, Vignette Glass, Printing Frame, Cutting Shapes, Light-tight Plate Box, Compound Focusser, Sensitised Paper, and large stock of Chemicals in Stoppered Bottles, &c.

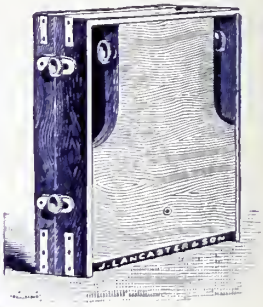
¼ 338C	½ 339C	1/1 340C	10×8 341C	12×10 342C
£8 8 0	£12 12 0	£16 16 0	£21 0 0	£25 0 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

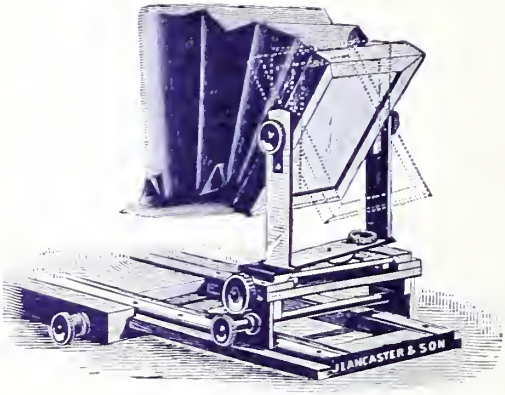
Lancaster's 1892 Special Patent Camera.





THIS Camera is of the best quality, Brass Bound, Leather Bellows, Fine Rack Adjustment to Front Carrier, with every possible motion; Rising Front, Angular Motions, both Vertical and Horizontal; Double Swing Back, Reversing Frame with Lateral Hinges, the whole folding up without the removal of a single part, and forming the most portable and compact Camera in the market.

Vertical Swing, Horizontal Swing to Front and Back.



Rising and Cross Fronts. Fine Rack Adjustment.

344	The Special 1892 Camera,	¼ plate	£2	10	0
345	,, ,,	½ ,, ...	4	0	0
346	,, ,,	1 ,, ...	5	5	0
347	,, ,,	10 x 8 plate...	6	10	0
348	,, ,,	12 x 10 ,, ...	7	10	0
349	,, ,,	15 x 12 ,, ...	8	15	0

EXTRA BRASS-BOUND SLIDES.

¼	½	1	10 x 8	12 x 10	15 x 12
12/6	17/6	25/-	30/-	42/-	50/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

First Quality Sets.

Lancaster's Special Patent Camera, Brass-bound, Double Dry Slide, Instantaneous Lens, with Patent Adjustable Diaphragms, Instantaneous Shutter, and best Mahogany Folding Stand, Leather-bound Case to carry Camera, Lens, and Slide, &c.

¼	½	1/1	10×8	12×10
344A	345A	346A	347A	348A
£4 4 0	£6 6 0	£8 8 0	£10 10 0	£12 12 0

Lancaster's Patent Camera, &c., &c., as above, but having Rectigraph Lens and Lancaster's Patent See-saw Shutter in place of Instantaneous Lens and Shutter. This is a perfect Camera and Lens.

¼	½	1/1	10×8	12×10
344B	345B	346B	347B	348B
£5 5 0	£7 17 6	£10 5 0	£12 15 0	£15 0 0

First Quality Complete Sets,

INCLUDING

Lancaster's Special Patent Camera, three Brass-bound Double Dry Slides, best Camera Stand, Rectigraph Lens, best Leather Case for Camera, Lens, Instantaneous Shutter and three Slides, Lancaster's Patent Ruby Lamp, three Ebonite Dishes, Plates, Scales and Weights, Measures, Vignette Glass, Printing Frame, Cutting Shapes, Light-tight Plate Box, Compound Focusser, Sensitised Paper, and large Stock of Chemicals in Stoppered Bottles, &c., &c.

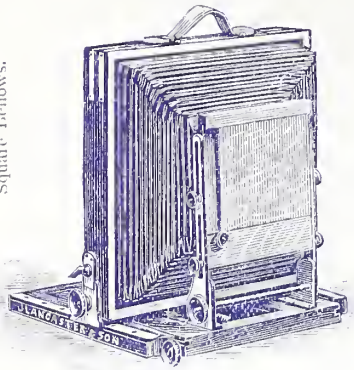
¼	½	1/1	10×8	12×10
344C	345C	346C	347C	348C
£8 8 0	£12 12 0	£16 16 0	£21 0 0	£25 0 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

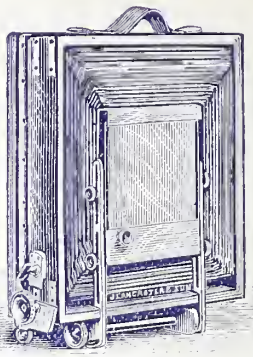
Lancaster's 1892 Extra Special Camera.

PATENT.)



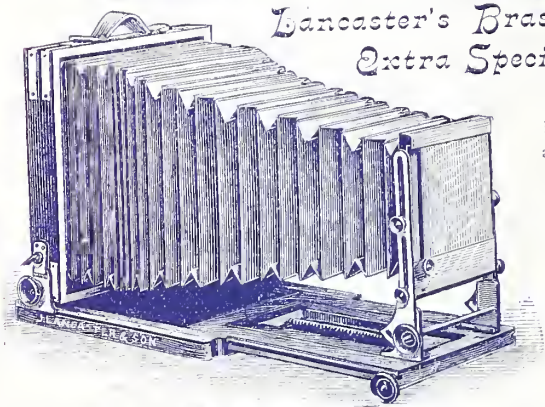
Combined Taper and Square Bellows.

For Short Focus Lens of Widest Angle.



Closed, Very Portable.

Lancaster's Brass Bound 1892 Extra Special Camera.



With one Brass-bound Double Slide. Suits Widest and Narrowest Angle Lens.

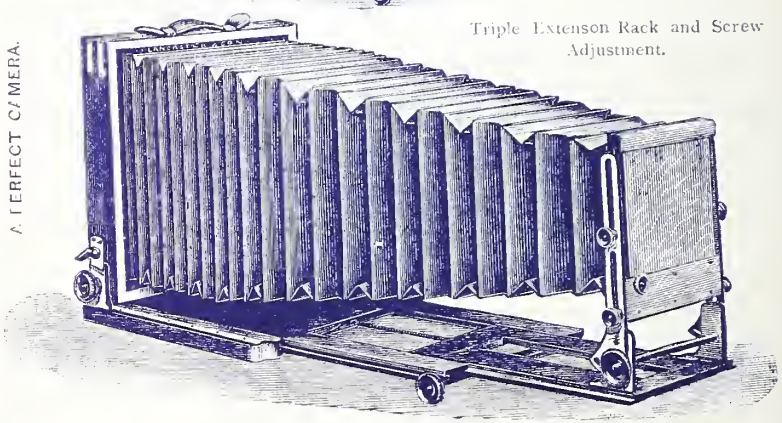
½ plate	...	£2	10	0
½ „	...	4	0	0
¼ „	...	5	5	0
10 × 8	...	6	10	0
12 × 10	...	7	10	0
15 × 12	...	8	15	0

Double Extension, for Long Focus.

Fit for any Climate.

Triple Extenson Rack and Screw Adjustment.

A PERFECT CAMERA.

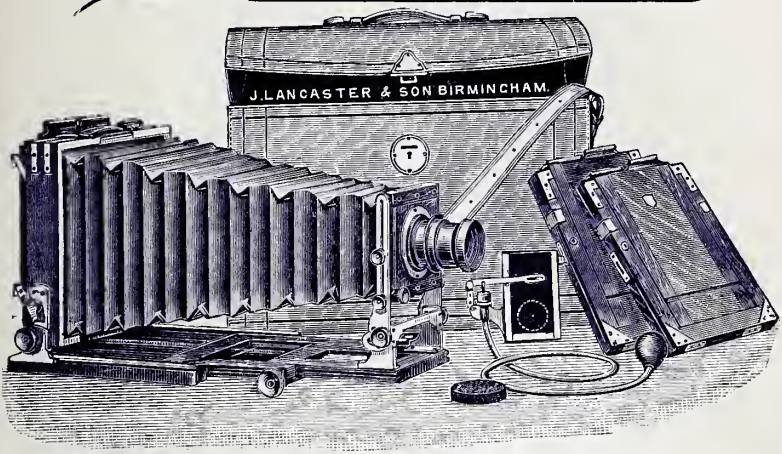


Extra Slides, same Prices as on Page cxiv.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

First Quality Sets.



LANCASTER'S EXTRA SPECIAL PATENT CAMERA, Brass-bound, Double Dry Slide, Instantaneous Lens, with Patent Adjustable Diaphragms, Instantaneous Shutter, and Best Mahogany Folding Stand, Leather-bound Case to carry Camera, Lens and Slide, &c.

¼ Ex. S. A.	½ Ex. S. A.	1 Ex. S. A.	10 x 8 Ex. S. A.	12 x 10 Ex. S. A.	15 x 12 Ex. S. A.
£4 4 0	£6 6 0	£8 8 0	£10 10 0	£12 12 0	£14 14 0

LANCASTER'S PATENT CAMERA, &c., &c., as above, but having Rectigraph Lens and Lancaster's Patent See-saw Shutter in place of Instantaneous Lens and Shutter. This is a perfect Camera and Lens.

¼ Ex. S. B.	½ Ex. S. B.	1 Ex. S. B.	10 x 8 Ex. S. B.	12 x 10 Ex. S. B.	15 x 12 Ex. S. B.
£5 5 0	£7 17 6	£10 5 0	£12 15 0	£15 0 0	£18 0 0

First Quality Complete Sets,

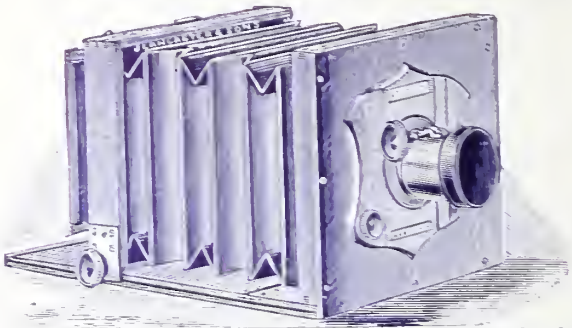
INCLUDING

LANCASTER'S EXTRA SPECIAL PATENT CAMERA, three Brass-bound Double Dry Slides, best Camera Stand, Rectigraph Lens, best Leather Case for Camera, Lens, Instantaneous Shutter and three Slides, Lancaster's Patent Ruby Lamp, three Ebonite Dishes, Plates, Scales and Weights, Measures, Vignette Glass, Printing Frame, Cutting Shapes, Light-tight Plate Box, Compound Focusser, Sensitised Paper, and large stock of Chemicals in stoppered Bottles, &c , &c.

¼ Ex. S. C.	½ Ex. S. C.	1 Ex. S. C.	10 x 8 Ex. S. C.	12 x 10 Ex. S. C.	15 x 12 Ex. S. C.
£8 8 0	£12 12 0	£16 16 0	£21 0 0	£25 0 0	£30 0 0

COLMORE ROW, BIRMINGHAM.

The Ladies' Camera Patent.



½ Plate
£1 15 0

¼ Plate
£3 0 0

¾ Plate
£4 5 0

10 × 8
£5 15 0

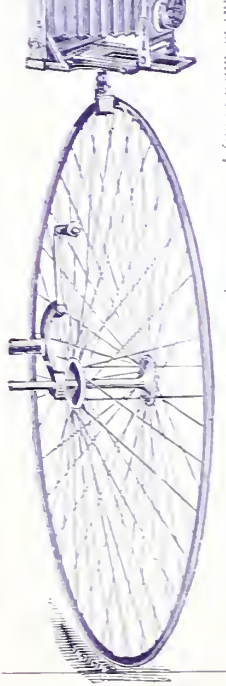
12 × 10
£7 0 0

15 × 12
£8 8 0

THIS Apparatus has been especially designed for Ladies. It is entirely free from complications, and although strong, yet is extremely light and portable. The apparatus consists of an excellent Portable Camera of Polished Mahogany, with Folding Tail Board, Patent Reversible Back, changing from vertical to horizontal in an instant thus enabling a vertical or horizontal photo to be taken without moving the Camera. Rising Front, &c., excellent Achromatic Lens in Rack Mount. There are no loose parts, and the whole Apparatus is most easily put together and used.

Complete Sets in Polished Cabinet, containing good supply of Chemicals, Plates, Paper, &c., &c.—½, £2 10s.; ¾ £4 4s.; ¼, £3.

Cycle Clip.



Cycle Clip, 4, 5/-; 4, 7/6; 1, 10/

May be fitted to any part of Machine, to a Gate, Window Sill, or Branch of Tree.

Lancaster's Patent Watch Camera.



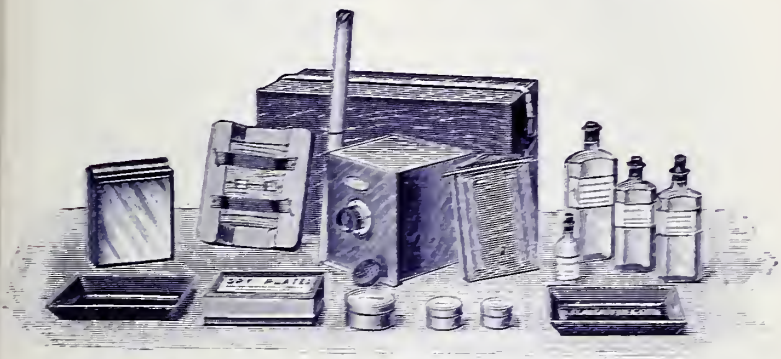
A NEW departure in Cameras. The Camera when closed is exactly like an ordinary watch. The Camera is opened in an instant by pressing a spring, when a series of about half a dozen tubes instantly shoot out into position, and by means of another spring an instantaneous exposure is made. The Lens is a very rapid one, and can be adjusted for taking portraits, groups, or views, &c., &c. Extra Plate Holders may be had to carry Sensitised Plates.

Large Watch Camera, easily carried in a waistcoat pocket, taking Photos 2 by 1½ inches with three Slides. 3l 6.

Extra Slides, 1/6 each. Instantaneous Plates, 6d. dozen.

COLMORE ROW. BIRMINGHAM.

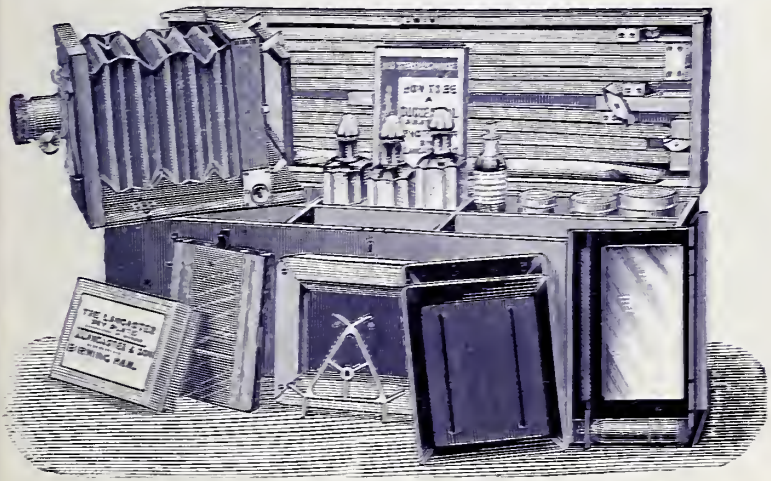
The Boy's Own Set.



A Capital Set for School Work. Complete Sets, with Chemicals, Paper, Dishes, &c. ¼, 21/-; ½, 42/-; 1/1, 63/-

— THE —

Amateur's Complete Outfit



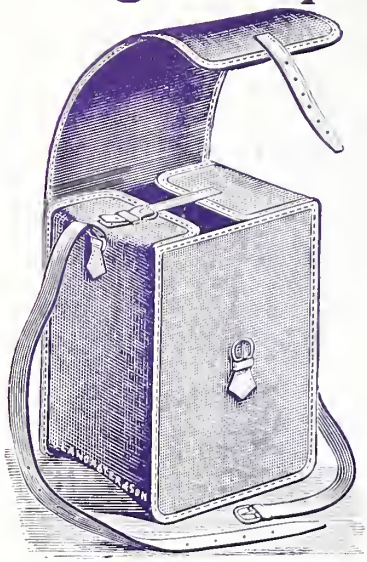
Consisting of excellent Camera, Instantaneous Lens, Patent Folding Lamp, Chemicals, Plates, Dishes, 3-fold Stand, and Book of Instructions.

¼, 50/-; ½, 84/-; 1/1, 120/-; 10 × 8, 150/-; 12 × 10, 180/-

COLMORE ROW. BIRMINGHAM.

J. LANCASTER & SON,

Cases for Cameras.



WATERPROOF CASES,

WITH SHOULDER STRAPS

¼, 5/-; ½, 7/6; ¼, 10/-; 10×8, 12/6; 12×10, 15/-; 15×12, 17/6.



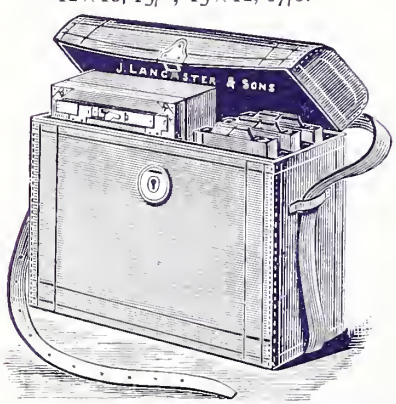
THE

Leather-bound Case.

A well-made Case, to carry Camera, Lens, and 3 Slides.

¼, 7/6; ½, 10/6; ¼, 15/-; 10×8, 21/-; 12×10, 25/-; 15×12, 30/-

These Cases are strong and are lined with Green Baize.



BEST

Leather Cases.

THESE are made out of the best Hide, lined with Velvet, with partitions to carry Camera, Lens, Three Slides, Tail Board, &c., Nickel-plated Lock and Key, Hand and Shoulder Strap.

¼, 17/6; ½, 25/-; ¼, 35/-; 10×8, 42/-; 12×10, 45/-; 15×12, 50/-

OTHER SIZES MADE TO ORDER.



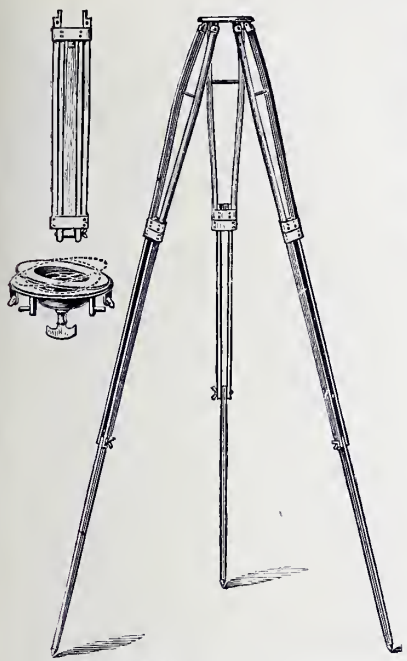
Waterproof Cases for Stands.

¼, 3/-; ½, 4/-; ¼, 5/-; 10×8, 6/-; 12×10, 7/-

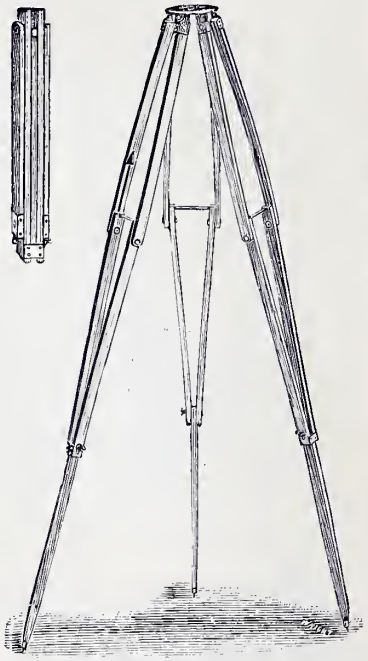
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

LANCASTER'S STANDS



THE UNIVERSAL STAND (PATENT).
¼ plate, 10/6; ⅛-plate, 15/-; ¼-plate, 21/-



THE THREE-FOLD STAND.
¼-plate, 6/6; ⅛-plate, 10/-; ¼-plate, 12 6.

CAMERA STANDS OF MAHOGANY, BIRCH, ASH, &c.

		¼	½	1	10×8	12×10
360	Camera Stand with Brass Top....	5/-	7/6	10/6	12/6	15/-
361	Mahogany Stand with Brass Top..	6/-	10/6	12/6	15/-	17/6
362	Ditto, with Triangle Top	10/-	12/6	15/-	18/-	21/-
363	Strong Ash Folding Stand.....	12/6	15/-	21/-	25/-	30/-



Head Rests.

H.R.	French Polished Head Rests to attach to Chair, with Adjusting Screws.....	£0 5 0
H.R.a	Do., with Universal Motions..	0 10 6
	Iron Head Rests, from	1 10 0



COLMORE ROW, BIRMINGHAM.

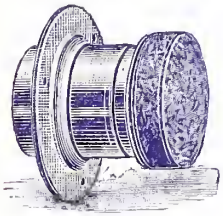
J. LANCASTER & SON,

LENSES

MESSRS. LANCASTER & SON again have pleasure in recording the fact that during the last eleven years they have sold over 120,000 of their Lenses, and have received the most flattering testimonials from the highest in the Profession, and the most distinguished Amateurs.

Messrs. LANCASTER & SON warn customers before purchasing to see that every Lens is stamped with their Trade Mark, or has their name engraved upon it in full. They carefully select only the best Flint and Crown, and do not send a Lens out unless it passes the most stringent testing.

These remarks apply to all Lenses of their manufacture.

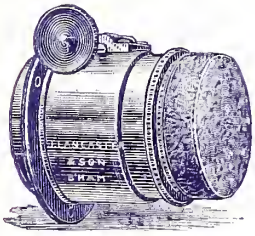


No. 374.

Landscape Lenses.

Mounted in Brass with Sliding Tubes. The Lenses are of the Meniscus form, giving perfect definition from centre to margin.

Size ..	¼	½	1	10×8	12×10	15×12
Focus	5½in.	9in.	12in.	16in.	20in.	24in.
PRICE	5/-	10/-	15/-	20/-	25/-	30/-



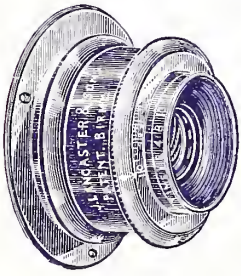
No. 375.

Superior Lenses.

RACKWORK MOUNTS.

Same Focus as No. 374.

¾	½	1	10×8	12×10	15×12
7/6	15/-	22/6	30/-	37/6	45/-



No. 376 N.A.

Narrow-angle Lens.

(Patent.)

This is an excellent Lens for Narrow-angle Work, giving superb definition.

Size ..	¼	½	1	10×8	12×10
Focus	8in.	12in.	18in.	21in.	24in.
PRICE	12/6	21/-	30/-	42/-	50/-

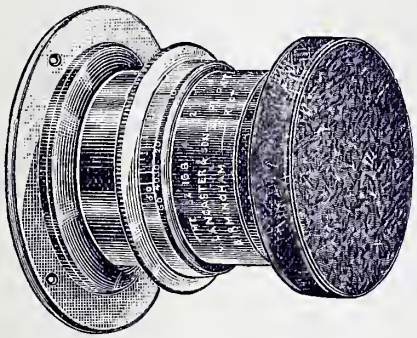
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

LANCASTER'S NEW LENSES.

The Rectigraph Series.

THE LENS FOR ARCHITECTURAL WORK, GROUPS, PORTRAITS, &c.



MOST EXCELLENT IN THE STUDIO AND IN THE FIELD.

No. 376.

Silver Ring Rapid Rectigraph

with Patent Adjustable Diaphragms.

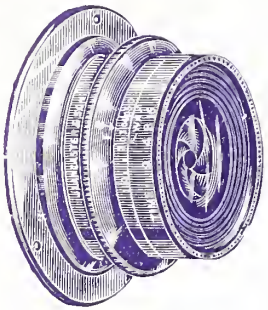
THESE are a series of Lenses of the highest quality, and are the result of long and tedious experiments. With them can be obtained beautifully modelled portraits, excellent groups and landscapes, and for architectural work they cannot be excelled. The Lenses, being both perfectly symmetrical, will work full aperture for portraits and groups, and when stopped down a little, will produce landscape and architectural photos that it would be impossible to surpass.

	¼	½	1/1	10×8	12×10	15×12
Diam. of Lens	1⅛	1⅜	1¾	2⅛	2¾	2⅝
Focus	5¼in.	8½in.	11½in.	14in.	18in.	24in.
PRICE	40/-	60/-	80/-	100/-	120/-	140/-
Mounted in Aluminium, Finest Quality ..	50/-	70/-	92/-	115/-	140/-	165/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

Lancaster's Rectigraph Lenses



376 W.A.

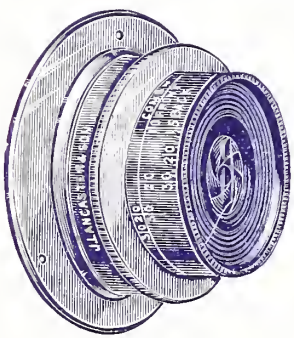
Rectigraph.

THESE Lenses are symmetrical, and when used either together as a Wide Angle Combination, or used singly as a Narrow Angle Lens, the definition is perfect. The foci of Combination and Back Lens are both given below.

MOUNTED IN BEST METAL WITH SILVER RING.

	¼	½	1	10x8	12x10	15x12	18x16	22x18
Focus of Wide Angle Rectigraph	3½in.	5in.	6½in.	8in.	9in.	11in.	14in.	17in.
Focus of Back Lens ...	7in.	10½in.	14in.	18in.	20in.	24in.	30in.	35in.
PRICE	30/-	42/-	50/-	63/-	70/-	80/-	100/-	120/-
Mounted in Aluminium	36/-	50/-	60/-	75/-	85/-	—	—	—

The graduations on Scale are for the Combination, and when using Back Lenses, they must be doubled.



376 C.

Combination Rectigraph.

(PATENT.)

THESE Lenses are of the highest quality, great care being taken in their construction. THE COMBINATION RECTIGRAPH can be used as a Wide, Ordinary, and Narrow Angle Lens, the different foci being given below.

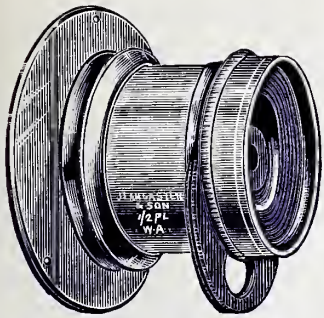
Combination Rectigraph Lens.

	¼	½	1	10x8	12x10	15x12
Focus of Combination	3½in.	4¾in.	6½in.	8in.	9in.	10in.
,, Front Lens	5in.	8in.	10in.	12in.	14in.	16in.
,, Back Lens	9in.	12in.	18in.	20in.	24in.	30in.
PRICE...	30/-	42/-	50/-	70/-	90/-	110/-
Mounted in Aluminium ...	36/-	50/-	60/-	80/-	105/-	—

The Scale has three sets of Graduations :—First for Combination; Second for Front Lens only; Third for Back Lens only.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,



Lancaster's New Wide-angle Lens.

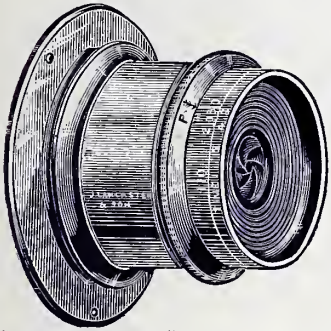
Wide-angle Lenses.

No. 377.

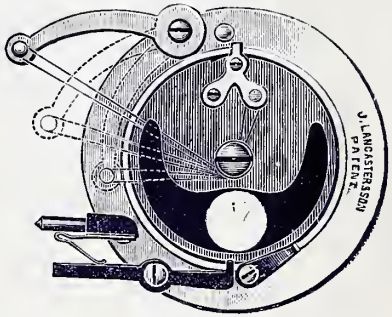
THESE Lenses are very useful in confined situations and for copying full size in an ordinary Camera. The focus of each is given below.

Size ..	¼	½	1	10×8	12×10
Focus ..	4	6½	8½	10	12in.
Price ..	10/6	15/-	21/-	25/-	30/-

Instantaneous Lenses.



Lancaster's New "Instantaneous" Lens (Patent).



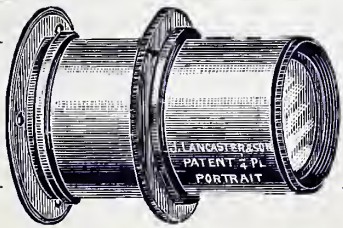
No. 378.

LANCASTER'S PATENT INSTANTANEOUS LENSES for Groups, Portraits, Landscapes or Architectural work, with our Patent Shutter, giving any length of exposure, and Patent Adjustable Diaphragms.

Size	¼	½	1	10 × 8	12×10	15×12
Focus	5½	8½	11	14	17	21in.
Price	21/-	30/-	42/-	52/6	63/-	84/-

RAPID,

PORTABLE,



EXCELLENT

DEFINITION.

No. 376 P.

PORTRAIT LENS WITH PATENT DIAPHRAGMS.

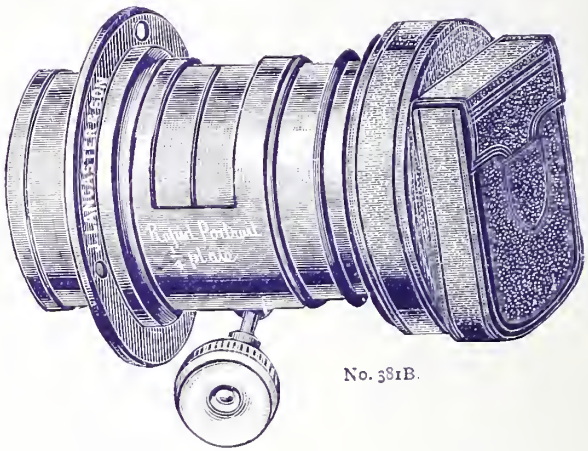
¼, 21/-; ½, 42/-; 1, 63/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

Portrait Lenses.

MESSRS. J. LANCASTER & SON have succeeded in producing Portrait Lenses of the highest quality at most reasonable prices.



No. 381B.

Series A.—GIVING EXCELLENT DEFINITION.

		£ s. d.
379A	CARTE LENS, with Set of Waterhouse Diaphragms. Excellent Working Lens	1 10 0
380A	CABINET LENS, ditto ditto ..	3 3 0
	FULL PLATE PORTRAIT LENS, ditto ditto ..	5 5 0
	12 × 10, ditto ditto ..	12 12 0

These Lenses have given great satisfaction.

Series B.—GIVING SUPERB DEFINITION, WITH GREAT RAPIDITY OF ACTION.

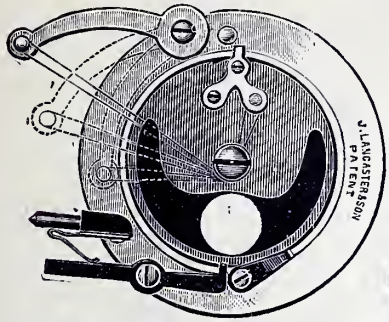
First Quality Rapid Portrait Lenses.

		£ s. d.
381B	VERY RAPID CARTE LENS, with Set of Waterhouse Diaphragms	3 15 0
382B	VERY RAPID CABINET LENS, with Set of Waterhouse Diaphragms	5 10 0
383B	Ditto ditto Full Plate	10 0 0
384B	Ditto ditto 12 × 10..	18 18 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

Instantaneous Shutters.



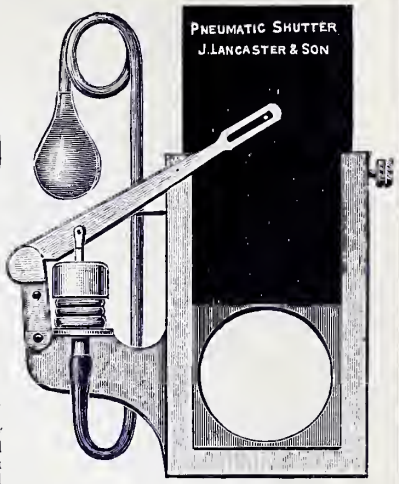
Of this Shutter over 40,000 have been sold.

LANCASTER'S PATENT

Instantograph ÷ Shutter.

WITH this PATENT SHUTTER almost any exposure may be given, as bands of all strengths may be used at the same time; an exposure of 100th of a second can be obtained with it, and down to almost anything.

¼, 5/-; ½, 7/6; ¼, 10/-; 10 x 8, 12/6; 12 x 10, 15/-



LANCASTER'S

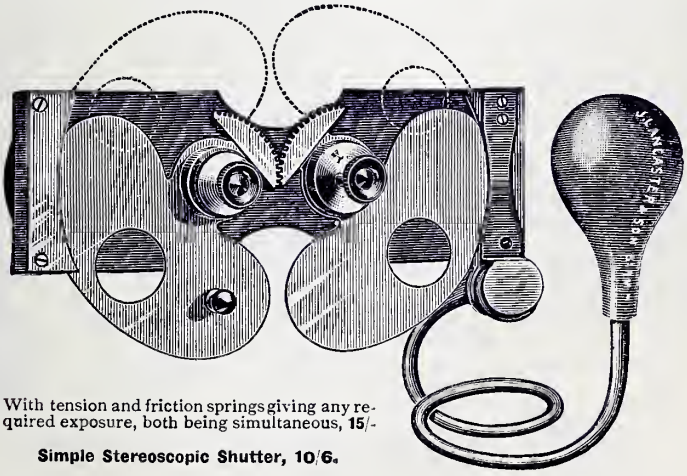
PNEUMATIC ÷ SHUTTER,

Giving either Rapid or Time Exposure.

THIS SHUTTER is a very good one for any exposure from $\frac{1}{20}$th of a second up to any length of time. The ball being pressed fills indiarubber bellows and keeps shutter up for any length of time; the shutter is very light indeed, and moves without the slightest vibration. The screw on right hand side at top is for accelerating speed.

Price, ¼-plate, 7/6; ½-plate, 10/6; ¼-plate, 15/-

Lancaster's Stereoscopic Shutter.



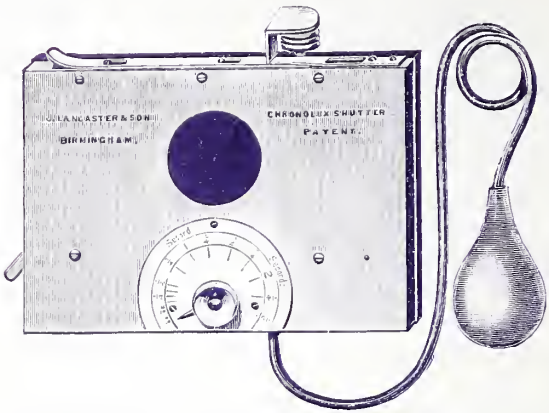
With tension and friction springs giving any required exposure, both being simultaneous, **15/-**

Simple Stereoscopic Shutter, 10/6.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

The 1892 Chronolux.

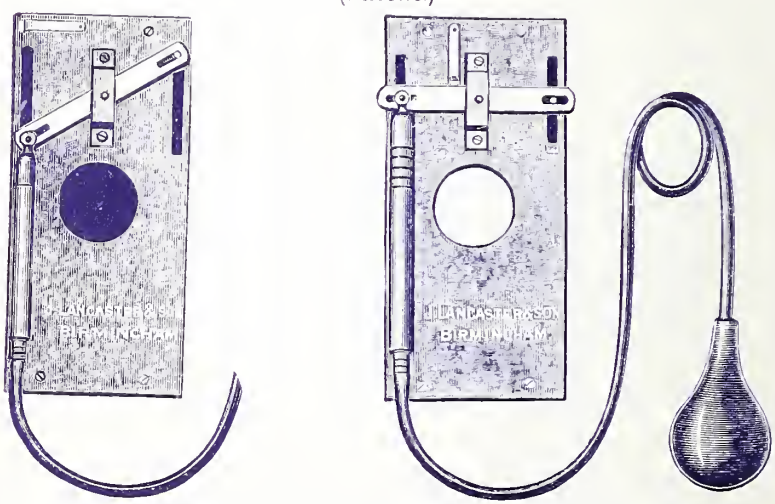


THE 1892 CHRONOLUX opens and closes at the centre, and moves without the slightest vibration; it works from $\frac{1}{64}$ of a second to 3 seconds.
The Shutters are beautifully finished, gilt, and oxidised.

Price, $\frac{1}{4}$-plate, 25/-; $\frac{1}{2}$-plate, 30/-; $\frac{1}{1}$-plate, 35/-

Lancaster's New See-saw Shutter.

(Patent.)



$\frac{1}{4}$-plate, 10/6; $\frac{1}{2}$-plate, 12/6; $\frac{1}{1}$-plate, 15/-; 10 x 8 plate, 21/-

IN beautifully finished brass mounts, giving any speed of exposure, and under the most perfect control.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

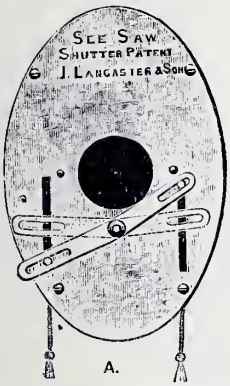
LANCASTER'S NEW SHUTTER.

The "See-saw" Patent.

THESE Shutters have been received by Professionals and Amateurs of long standing with the highest praise. Their encomiums have, we believe, been deserved, as the See-saw Shutter is without doubt

THE SIMPLEST, SAFEST & MOST COMPLETE SHUTTER EVER MADE.

Over 10,000 have been already sold and the demand is increasing enormously.



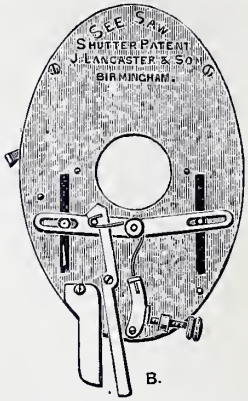
A.

SEE-SAW SHUTTER.

SIMPLE FORM A.

¼, 5/- ; ½, 7/6 ; ¼, 10/-

THIS Shutter opens and closes in centre, and is moved by means of small cords ; any exposure can be obtained without the slightest jar.



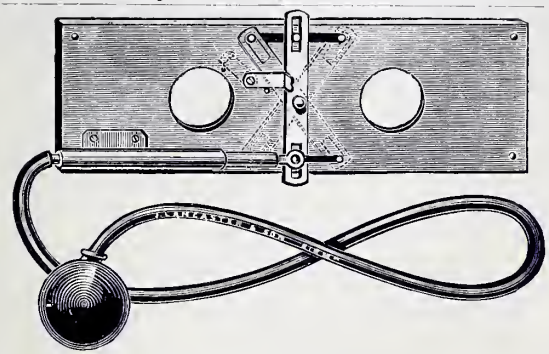
B.

SEE-SAW SHUTTER.

FORM B.

¼, 6/6 ; ½, 8/6 ; ¼, 12/6.

THIS has Spring for exposing and can be worked at a high speed, or for time exposures by using the lever at bottom of Shutter.

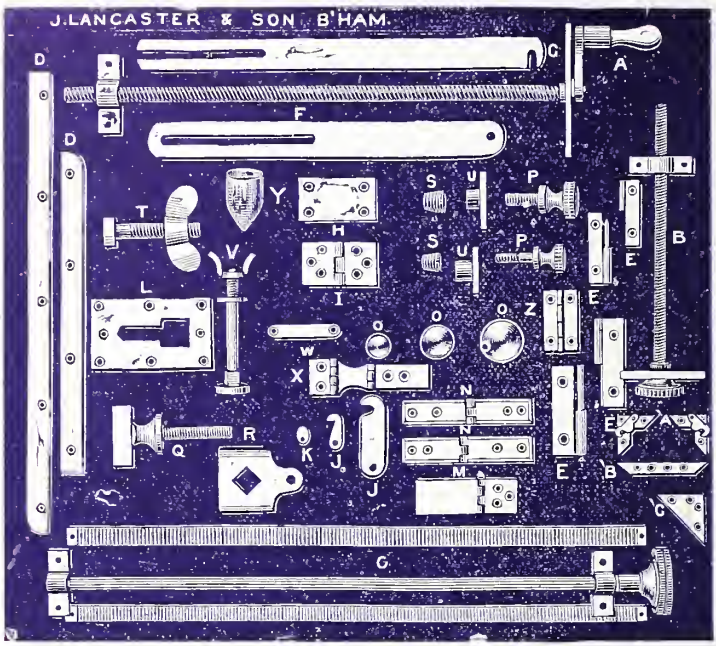


Stereoscopic See-saw Shutter.

With Pneumatic arrangement, 17/6.

COLMORE ROW, BIRMINGHAM.

Sundries.



	¼	½	1/1	10 x 8	12 x 10	15 x 12
A. Strong Screw for Cameras ..	2/6	4/-	6/6	8/6	10/6	12/6
B. Lighter „ „ „ ..	2/-	3/6	5/6	7/6	8/6	10/6
C. Racks and Pinion	3/-	5/-	7/6	10/6	12/6	15/-
D. Brass Strips for Camera Backs, per pair	-/6	-/9	1/-	1/3	1/6	2/-
E. Pull-off Hinges, per pair ..	-/2	-/2	-/3	-/3	-/3	-/3
F. Stretcher for Meritoire, each ..	1/-	1/6	2/-	2/6	3/-	3/6
G. „ „ Instantograph, each	1/-	1/6	2/-	2/6	3/-	3/6
H. Plates for Stands, each.. ..	-/1	-/1	-/2	-/2	-/2	-/2
I. Hinges for Tail Boards, per pair	-/2	-/3	-/4	-/4	-/6	-/6
J. Hooks for Slides, per pair ..	-/1	-/1	-/1	-/1	-/1	-/1
J. „ „ Stands „ ..	-/2	-/2	-/3	-/3	-/4	-/4
K. Turn Buttons for Slides, per pair	-/1	-/1	-/1	-/1	-/1	-/1
L. Plates for bottom of Cameras ..	1/-	1/-	1/3	1/3	1/6	1/6

SUNDRIES.

	¼	½	¼	10 × 8	12 × 10	15 × 12
M. Clip Hinges for Dark Slides, per pair	-/2	-/2	-/3	-/3	-/4	-/4
N. Hinges for Focussing Glass, per pair	-/2	-/2	-/3	-/3	-/4	-/4
O. Rising Front Screws, each ..	-/4	-/5	-/6	-/8	-/8	-/8
P. Screws for bottom of Camera, each	-/4	-/6	-/6	-/6	-/9	-/9
Q. T Screws for Stands	-/6	-/8	-/8	1/-	1/-	1/-
R. Ears for Stands, per set of 6 ..	-/4½	-/6	-/9	1/-	1/-	1/4
S. Bushes for Screws, per pair ..	-/1	-/1	-/1	-/2	-/2	-/2
T. Screw and Butterfly for Stands ..	1/-	1/-	1/-	1/6	1/6	1/6
U. T Bushes for Cameras, each ..	-/1	-/2	-/2	-/3	-/3	-/3
V. Screws for Stands, set of 3 ..	1/-	1/3	1/6	1/6	1/9	2/-
W. Straps for Focussing Frame, set of 4	-/2	-/3	-/4	-/4	-/4	-/4
X. Double Hinges for Focussing Frame	-/3	-/3	-/4	-/4	-/6	-/6
Y. Toe Caps, all in one piece (3) ..	-/3	-/4	-/4	-/6	-/6	-/9
Z. Hinges for Dark Slides, &c., per pair	-/2	-/3	-/4	-/4	-/6	-/6
A′ Corner Plates for reversing back, &c., per pair	-/3	-/4	-/4	-/6	-/6	-/6
B′ Corner Plates for Slides, &c., per pair	-/2	-/2	-/3	-/3	-/4	-/4
C′ Angle Plates for reversing back, &c., per pair	-/2	-/2	-/3	-/3	-/4	-/4
Cloth Bellows, ordinary length.. ..	1/6	3/-	4/6	6/-	9/-	12/-
,, ,, ,, square.. ..	2/-	3/9	5/6	7/6	10/-	13/-
,, ,, ,, Kinnear ..	2/6	5/-	7/6	10/-	15/-	18/6
Leather Bellows ,, oblong ..	2/6	4/6	6/6	8/6	12/6	15/-
,, ,, ,, square.. ..	3/-	6/-	8/6	10/6	15/-	20/-
,, ,, ,, Kinnear ..	4/-	8/-	12/6	15/-	21/-	30/-
Complete Set of Brass Work for 1892 Merveilleux	5/6	7/6	10/6	12/6	15/-	
Ditto, for 1892 Meritoire	7/6	10/6	12/6	15/-	18/-	
Ditto, for 1892 Instantograph ..	10/6	15/-	21/-	25/-	30/-	
Fine Ground Focussing Glass	-/6	1/-	1/6	2/-	2/6	3/-
Merveilleux Lens, unmounted	3/-	6/-	10/-	15/-	20/-	30/-
Instantograph ,, ,, ...	12/6	21/-	30/-	40/-	50/-	60/-
Brass Tops for Stands	1/6	2/-	2/6	3/-	3/6	4/-
Triangle ,, ,, ...	2/6	3/-	4/-	5/-	6/-	7/-
Leather Caps for Lenses	-/6	-/6	-/8	-/8	1/-	1/-
Black Cardboard for Slides, per doz.	-/6	-/9	1/-	1/6	2/-	2/6
Springs for Printing Frames, per pair..	-/3	-/4	-/6	-/8	-/10	1/-
Flanges to Lenses	1/-	1/6	2/-	2/6	3/-	3/6
Extra Fronts	1/-	2/-	2/6	3/-	3/6	4/-

Bellows of any size made to Order.

Dark Slides made to Order.

COLMORE ROW, BIRMINGHAM.

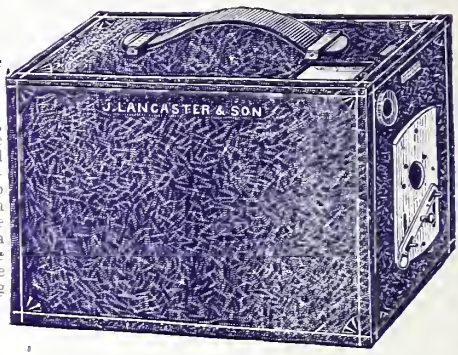
J. LANCASTER & SON,

LANCASTER'S

1892 "Omnigraph"

(PATENT).

EVERYBODY'S DETECTIVE.
SIMPLEST OF HAND CAMERAS



THE OMNIGRAPH is a simple, cheap, and excellent Hand Camera. The simplicity of its mechanism, and the easy method of exposing and changing plates, have made the Omnigraph already highly popular. The Camera proper consists of a chamber having the lens and shutter at one end, and a specially-prepared roller shutter at the other end. Behind this shutter is a space which holds a changing box containing six plates in three double carriers.

¼-plate, 21/- Weight, 1¾ lbs.

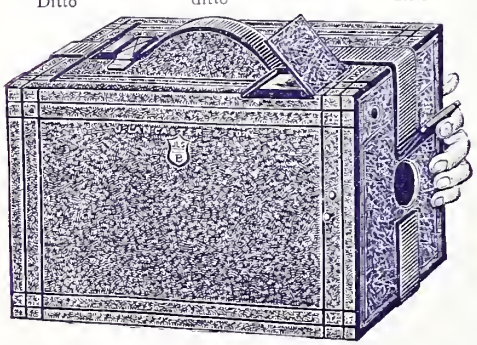
The "Omnigraph" is a Detective Camera made to satisfy a large and increasing demand for a really serviceable Camera at a moderate and popular price.

The "Omnigraph" is a very good Camera, strongly made, and either covered in good cloth or of a superior finish and covered in best leather.

The lens is an Achromatic Meniscus one, and has our patent "See-saw" Shutter. The changing box carries six plates or films changed in an instant, and extra boxes may be had so that any number of films or plates can be carried. The plates are put in our Patent Carriers, which cannot possibly damage a plate.

Size of ¼-plate Omnigraph, 8 in. x 6 in. x 5 in.

Price, complete with Finder, to carry six 4¼ x 3¼ in. plates			...	...	£1 1 0
Ditto	ditto	covered in best leather ...	...	...	1 5 0
Ditto	ditto	ditto	5 x 4 in.	...	1 10 0
Ditto	ditto	ditto	6½ x 4¾ in.	...	2 5 0



Superior Omnigraph, 4¼ x 3¼
£1 11 6

Superior Omnigraph, 5 x 4
£2 2 0

Superior Omnigraph, 6½ x 4¾
£3 3 0

Extra Changing Boxes with Metal Carriers for six plates:—

¼, 7/6; 5 x 4, 10/6;
6½ x 4¾, 15/-

SUPERIOR OMNIGRAPH.

Superior Omnigraph covered in best leather, all parts hidden, made to represent travelling case. Complete with Finder, best Achromatic Meniscus Lens, See-saw Shutter, and Iris Diaphragms.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

LANCASTER'S

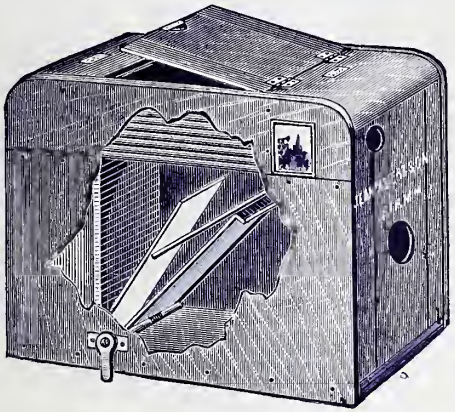
Perfect Hand, Magazine, or Detective Camera.

THE "ROVER" (PATENT)

COMPLETE.

No. 1.
$3\frac{1}{4} \times 3\frac{1}{4}$
£2 12 6

No. 2.
$4\frac{1}{4} \times 3\frac{1}{4}$
£3 3 0



No. 3.
5×4
£4 4 0

No. 4.
$6\frac{1}{2} \times 4\frac{3}{4}$
£5 5 0

No 5.
$7\frac{1}{2} \times 5$
£6 0 0

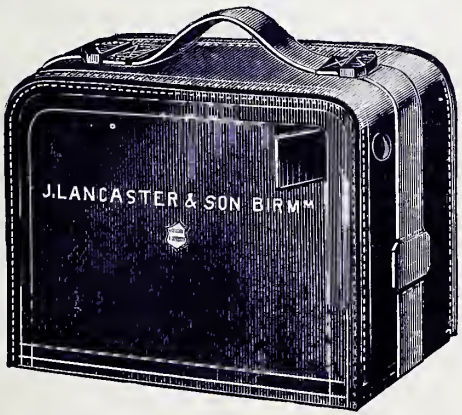
386.

THE "Rover" is one of the most perfect Cameras ever put in the market; it consists of practically three chambers:—(A) A space at top holding twelve Plates or Films in our new Patent Sheaths or Carriers, (B) the Camera proper, and (C) a space at back to hold twelve Plates after exposure. Each chamber is light-proof.

THE method of exposure is as follows:—Press Lever at bottom of Camera slightly forward; this allows one Plate to fall; then move Lever backward, and Plate falls into position.

THE Plate, after exposure, goes into back chamber, a Venetian shutter being opened and closed.

THE Lens is a specially-made one, very rapid, with See-saw Shutter, Patent Adjustable Diaphragms, and each Camera has a Finder. The whole is enclosed in a best Leather Case, of most convenient and handy size.



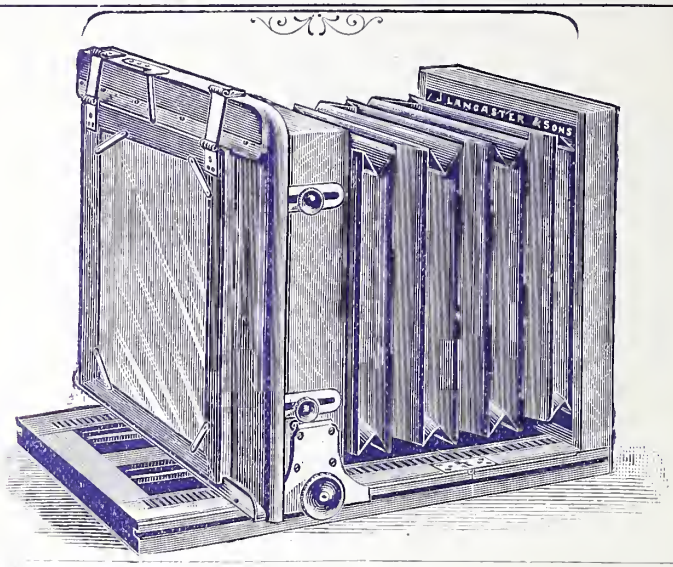
ONLY one Plate is in Camera at time of exposure, all others are in light-proof chambers.

The Camera is exceedingly simple in use.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

New Studio Camera.



398	UNIVERSAL CAMERA, ½-plate, with Repeating Back, Rack Adjustment, Double Swing, Bellows Body, taking Cabinet, Portrait or Group, and one or two Cartes on a plate .. .. Extra Slides, 12/6 each.	£2 5 0
398B	BRASS BOUND STUDIO CAMERA of best quality and finish, Leather Bellows .. .. Extra Slides, 17/6 each.	3 5 0
399	UNIVERSAL CAMERA, ½-plate, ditto, ditto, taking two Cabinets on one plate, two Cartes on one plate, or one Cabinet or one Carte .. .. Extra Slides, 18/- each.	3 10 0
399B	BRASS BOUND ditto, ditto .. .. Extra Slides, 24/- each.	4 12 6
400	UNIVERSAL CAMERA, 10 × 8, ditto, ditto, to take Promenade, Malvern, Cabinets, and Cartes size .. Extra Slides, 24/- each.	6 5 0
400B	BRASS BOUND ditto, ditto .. .. Extra Slides, 35/- each.	7 10 0
401	UNIVERSAL CAMERA, 12 × 10, with Carriers for all sizes down to ¼, and every convenience for large Studio work	9 9 0
401B	BRASS BOUND, ditto, ditto	11 0 0

Extra Fronts, 398, 2/6; 399, 3/-; 400, 3/6; 401, 4/-

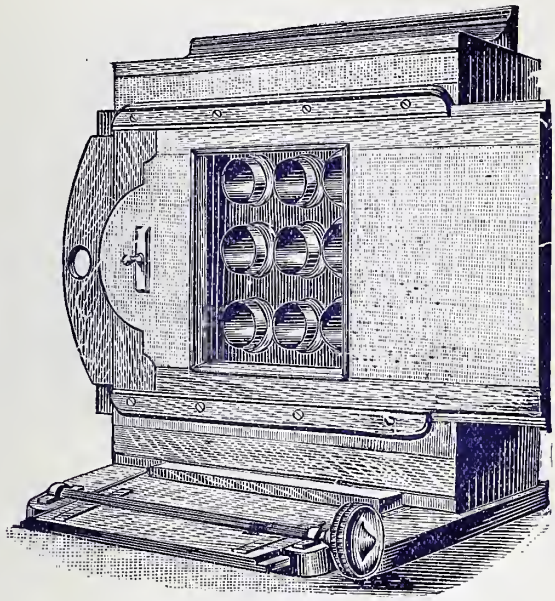
Double Dry Slides, 398, 15/-; 399, 21/-; 400, 30/-; 401, 42/- each.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

Gem and Victoria Apparatus.

Will take 36 Gems on 7×5 plate.
" 9 Victorias " "



Will take 12 Gems on ¼-plate.
" 4 Victorias "

No. 410 APPARATUS.

OUR Apparatus have now been in the Market for years, and have received the highest approbation. We guarantee every Lens of the best quality.

403	Polished Mahogany Camera, with 4 superior double combination Achromatic Lenses, Repeating Back, taking 12 superior gems on a ¼-plate Ferrotype ..	£2 10 0
404	Ditto, ditto, with 6 Lenses, to take 12 on ¼-plate in two positions, with Rackwork Adjustment	3 0 0
405	Superior ditto, with 9 Lenses, to take 9 on ⅙-plate, or 18 on 5×3½ plate, with Rackwork Adjustment ..	4 0 0
406	Superior Mahogany Camera, with 12 selected Lenses, Rackwork Adjustment, Instantaneous Shutter, will take 9 gems on ⅛-plate, 12 on ¼-plate, 24 on 5×4, and 36 on 7×5 plates, &c.	6 6 0

GEM LENSES.

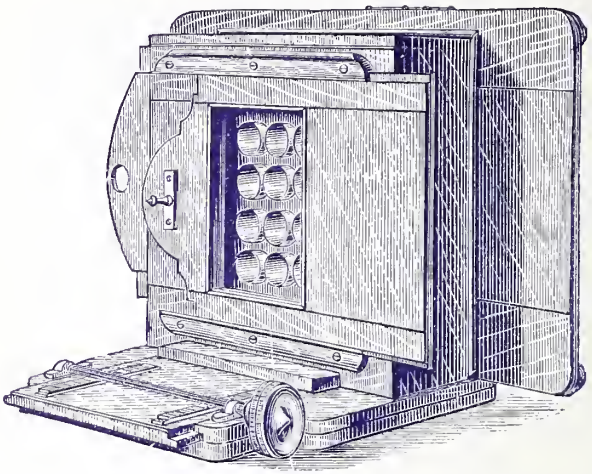
FINEST QUALITY, 6/- per Lens, in sets of 4, 6, 9 and 12 on plate.
SECOND QUALITY, 5/- per Lens, in sets of any number.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

GEM & VICTORIA APPARATUS.

Will take 36 Gems on 7×5 plate.



Will take 12 Gems on ¼-plate.

No 406.

407	Polished Mahogany Camera, with 2 large Achromatic Double Combination Lenses, to take 4 Victorias in two positions, on ¼-plate	£2 10 0
408	Superior Camera, with Rackwork Adjustment, Instantaneous Shutter, 4 best Lenses, to take 4 Victorias on ¼-plate	3 10 0
409	Excellent Camera, with Rackwork Adjustment, Repeating Back, and set of Victoria Lenses, to take either 4 Victorias at once on ¼-plate, or 8 on 7×5 plate in two positions	5 5 0
410	Combined Gem and Victoria Camera, best quality, with 9 selected Victoria Lenses, Extra Dark Slide, Rackwork Adjustment, and all latest improvements, taking 4 Victorias on ¼-plate, 9 Victorias on 7 × 5, or 36 Gems on 7×5 in four positions	8 8 0

Victoria Lenses.

FINEST QUALITY, 9/- per Lens in sets of 2, 4, 6 or 9 on plate.
SECOND QUALITY, 7/- per Lens in sets of any number.

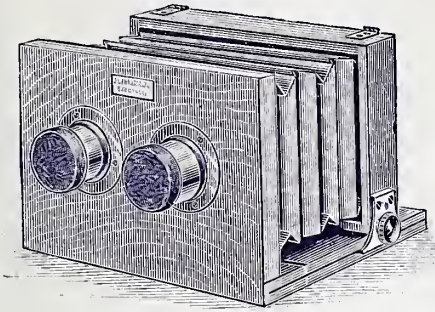
APPARATUS FOR CARTE MIDGETS, &c. OTHER SIZES AND COMBINATIONS TO ORDER.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

Stereoscopic Cameras.

BEST LENSES
RAPID or SLOW
AT WILL.

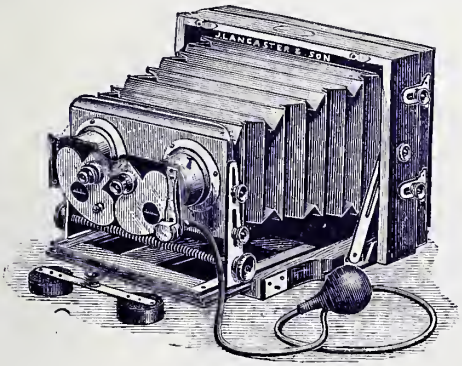


CAMERAS
BEST MAKE,
PORTABLE.

STEREO MERVEILLEUX.

419 THE STEREO MERVEILLEUX consists of a well-made mahogany Camera, with one Double Slide, pair of good Lenses, and Camera Stand £2 2 0

420 THE STEREO MERITOIRE, much superior 3 3 0



STEREO INSTANTOGRAPH.

421 THE STEREO INSTANTOGRAPH is a most excellent apparatus with Instantaneous Shutter, best Lenses and Stand; the Slide measures $6\frac{3}{4} \times 3\frac{1}{4}$.. .. .. £4 4 0

422 THE STEREO INSTANTOGRAPH, with an arrangement for taking plates $7\frac{1}{2} \times 4\frac{1}{2}$ and smaller plates, and extra bellows for Stereo work, a splendid Camera for general work. .. 5 5 0

RECTIGRAPH LENSES fitted to 421 and 422, £2 2 0 extra.

DOUBLE DRY SLIDES, 419 and 420, 10/6; 421, 12/6; 422, 15/- each.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

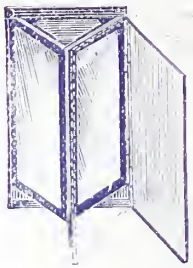
Lancaster's Patent Lamps.

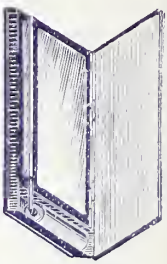


RUBY LAMP (OIL).



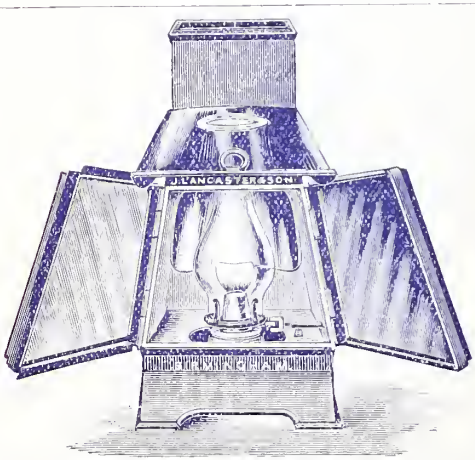
RUBY LAMP (CANDLE.)



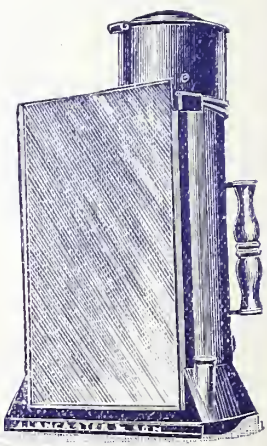


PATENT FOLDING RUBY LAMP.
Folds into ¾ inch.

RUBY LAMP, Oil Burner	2 -
Ditto, with Self-feeding Arrangement for Candle	3
PATENT FOLDING RUBY LAMP...	5
RUBRALUX LAMP	7 6
Ditto larger size	10 6
PARABOLOID LAMP	10/6
Ditto larger size for Gas with Burner	17 6



RUBRALUX LAMP.



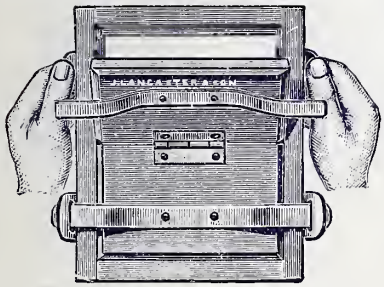
LARGE PARABOLOID RUBY LAMP.
(For Petroleum or Gas.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

PRINTING ÷ FRAMES

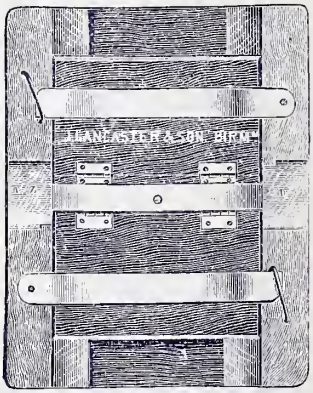
	¼	½	1/1	10×8	12×10	15×12
Cheap Printing Frames	-/6	1/-	1/6	2/-	3/-	4/-
Best Quality	-/9	1/6	2/3	3/-	4/3	5/3



NEW PRINTING FRAME,

With Slide Clip Arrangement.

¼-pl., -/9 ; ½-pl., 1/6 ;
1/1-pl. 2/3 ; 10×8, 3/-



LANCASTER'S

New Mahogany Triple-pressure Printing Frame

enabling both ends of Print to be examined at the same time without the least fear of moving Print.

¼, 1/6 ; ½, 2/3 ; Stereo, 2/3 ; 1/1, 3/6 ; 10×8, 4/9 ; 12×10, 6/- ;
15×12, 7/6 each.

This is a perfect Printing Frame, no unequal pressure and no breaking of negatives. The Frames are well made and very durable.

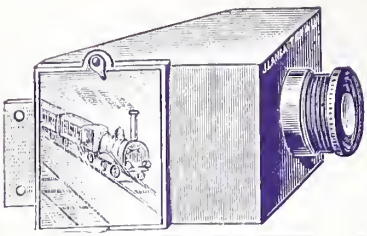
PLATE BOXES, &c.

	¼	½	1/1	10×8	12×10	15×12
White Wood Plate Boxes to hold 12	1/-	1/9	2/6	4/-	5/-	7/-
Ditto ditto ,, 25	1/6	2/3	3/6	5/6	7/-	9/6
Ditto ditto ,, 50	2/-	3/-	4/-	6/6	8/-	10/6
Draining Racks, 12	1/3	1/6	2/-			
,, ,, 24	1/6	2/-	2/6			
Mahogany or Walnut Plate Boxes, with Lock and Key, to hold 12 Plates	3/-	4/-	6/-	8/6	10/6	12/6
Vignette Glasses .. .. each	-/9	1/6	2/3	3/-	4/6	

CARDS, Carte Size, 1/-, 1/3, 1/6, 1/8, 2/-, 3/-, and 4/- per 100.
,, Cabinet Size, 6d., 8d., 1/- and 1/6 per dozen.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,



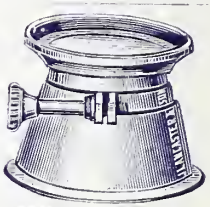
Lancaster's New Finder

THIS is an excellent Finder, which can be attached in a second to the side or top of Camera, giving an exact image, covering same field as Lens in Camera. Beautifully finished, 5/-

With two Brackets, one to screw on to side and the other on top of Camera.

LANCASTER'S Compound Focusser.

To be used without a Cloth, 2/6.



A MOST USEFUL ACCESSORY.



LANCASTER'S Amateur's Re-touching Desk,

Folding into small compass, fitted with two Re-touching Pencils, with side wings.

¼	½	1	10×8	12×10
5/-	7/6	10/6	15/-	21/-

RE-TOUCHING DESKS,

In Polished Mahogany, of Highest Finish

¼-plate, 12/6; ½-plate, 15/-; 1-plate, 18/-

RUBBER SQUEEGEES,

1/- and 1/6.

PRINT TRIMMER,

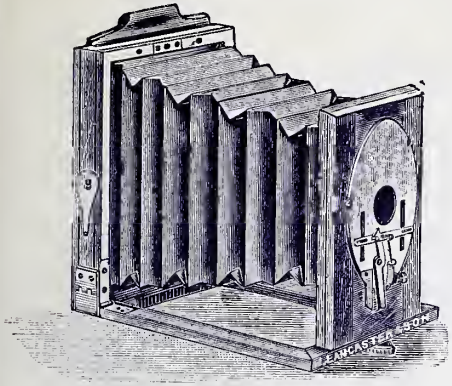
1/- and 2/6.



COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

Lancaster's New Cameras.



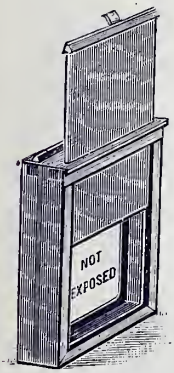
A MARVEL OF COMPACTNESS. CLOSES INTO 1 INCH.

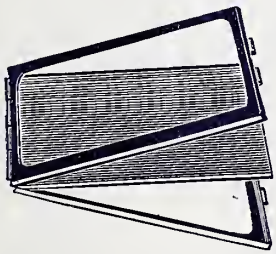


LANCASTER'S "SNAP SHOT" CAMERA (PATENT).

THIS CAMERA is the most portable ever made. The ¼-plate Camera, Lens and Shutter fold into 1 inch depth, and weight 1 lb. The ½-plate is equally light and compact.

The Changing Box carries three Double Carriers, which may be filled with







Plates, Films, or Bromide Paper. There is no dark slide, and no trouble focussing. The lens is of fixed focus and has our "See-saw" Shutter for Instantaneous or time exposures.

PRICE COMPLETE.—¼-plate, £2 2 0 ½-plate, £4 4 0



THE

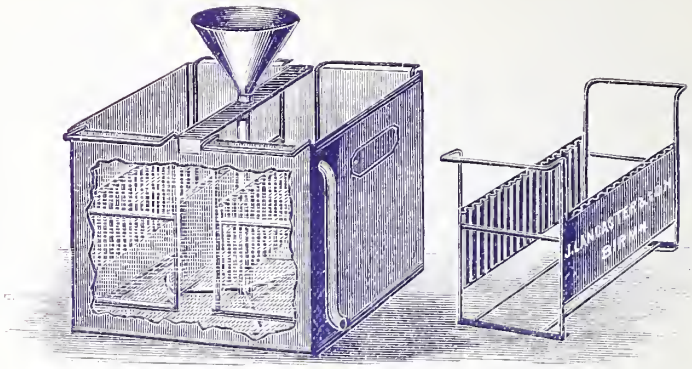
"Long-shot" Camera.

Opens in a second, and carries 6 plates. Folds into 1 inch.

¼, 42/- ½, 84/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,



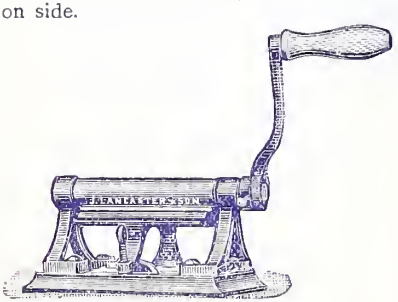
Lancaster's "Hiero" Washer,

FOR NEGATIVES OR PRINTS.

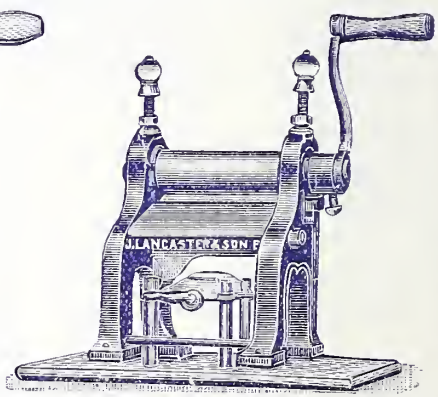
For 1 dozen ¼-plates, 5/-; ½-plates, 7/6; ¼-plates, 10/6.

EACH HOLDS 26 PLATES.

THE "HIERO" WASHER consists of a square metal vessel, japanned outside and enamelled white inside. It has two racks to hold the plates, which may be used as dryers. The water enters through funnel and passes down centre tube and out of the bent ends, thus causing the funnel and tubes to rotate; this gives a supply of water under the whole of the plates, and keeps up a continuous circulation, the waste being emptied periodically by the Syphon on side.



THE AMATEURS' BURNISHER.



LANCASTER'S AMATEURS' BURNISHERS,

WELL MADE AND EXCELLENT IN ACTION.

CARTE, 10/6; CABINET, 15/-; ¼, 21/-; 10×8, 24/-; 12×10, 27/6; 15×12, 31/6.

SUPERIOR QUALITY, ¼, 15/-; ½, 21/-; ¼, 30/-; 10×8, 35/-; 12×10, 40/-

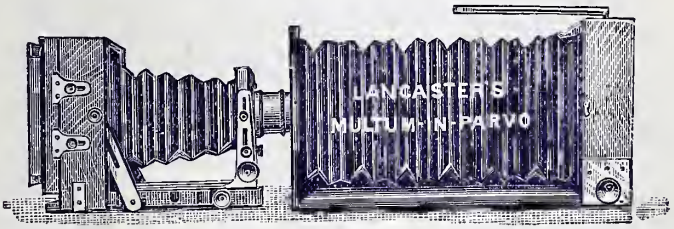
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

LANCASTER'S
Multum-in-Parvo Camera.

THE MULTUM-IN-PARVO CAMERA can be used with any ordinary Camera, and may be used for enlarging, copying same size, or reducing also for Lantern Transparencies.

A CAPITAL DAYLIGHT ENLARGING APPARATUS.



FOR ENLARGING.—The Negative must be placed in a Dark Slide of ordinary Camera, and the enlargement taken in Multum-in-Parvo, the plate going into the end of Camera.

FOR COPYING same size, the two Cameras must be opened out equally to about twice the length of focus of lens used.

FOR REDUCING.—The Negative must be placed in Multum-in-Parvo Camera and Plate put into Dark Slide of ordinary Camera.

Prices :

To enlarge up to ¼-plate ..	£0 10 6	To enlarge up to 18×16-plate	£3 0 0
,, ,, ½ ,, ..	0 15 0	,, ,, 20×18 ,,	3 15 0
,, ,, 1/1 ,, ..	1 1 0	,, ,, 24×20 ,,	4 4 0
,, ,, 10×8-plate	1 5 0	,, ,, 30×24 ,,	5 5 0
,, ,, 12×10 ,,	1 10 0	,, ,, 36×30 ,,	8 8 0
,, ,, 15×12 ,,	2 0 0		

Extra Slides:—¼, 5/-; ½, 7/6; 1/1, 10/-; 10×8, 13/6; 12×10, 16/-; 15×12, 20/-

The Amount of Enlargement or Reduction can be varied to any amount.

Requisites for Lantern Slides.

PAPER MASKS, 3¼in. SQUARE.

In Shapes—OBLONG CUSHION, CIRCLE, CUSHION, OVAL, AND DOME.
3d. per dozen; 3/- per gross.

BEST POLISHED CROWN COVER GLASSES

3¼in. square, for mounting transparencies, 6d. per dozen; 5/- per gross.

ADHESIVE BINDING STRIPS.

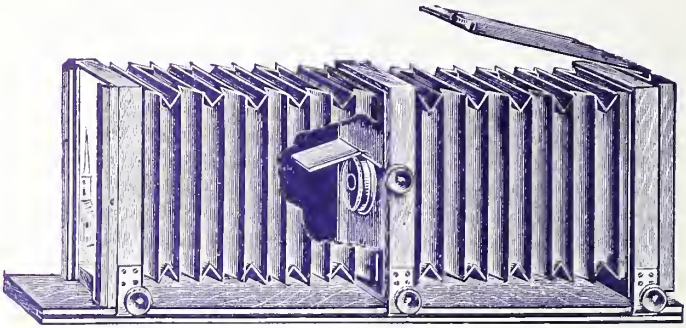
1d. per dozen; 1/- per gross.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

LANCASTER'S

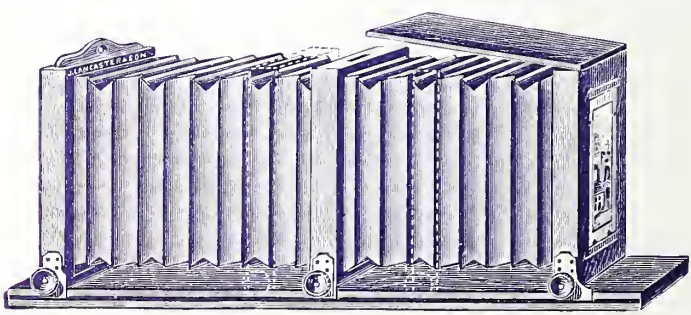
Lantern Slide Multum-in-Parvo.



THIS is a well-made Camera, with Double Bellows, Mahogany Slide, and Focussing Slide; excellent Lens with Shutter. The Camera can be used for copying prints, photographs, &c., exactly as an ordinary Camera, and for making Lantern Slides it is used as represented in woodcut.

Camera, Lens, Flap Shutter, &c., ¼-plate, 21/-

LANCASTER'S COMBINATION MULTUM-IN-PARVO



THIS is a well-made Camera with Double Bellows, the front part detachable, so that Camera and Lens may be used for ordinary work. The Lens is an Achromatic one, specially constructed for enlarging and reducing. Each Set consists of Camera, Dark Slide, and Achromatic Lens.

Combination Multum-in-Parvo, 35/-

10 × 8, 42/- 12 × 10, 50/- 15 × 12, 63/- 18 × 16, 105/- 24 × 20, 126/-

The Dark Slide will hold either a Dry Plate or Bromide Paper, and can have Carriers to carry any size Plate.

EXTRA SLIDES.—¼, 10/-; 10×8, 13/6; 12×10, 16/-; 15×12, 20/-; 18×16, 30/-; 24×20, 35/-

CARRIERS .. .. ¼, ½, ¼, 1/- each. 10×8, 12×10, 1/6 each.
,, ... 15×12, 1/6 18×16, 3/- 24×20, 3/6 ,,

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

THE "LANCASTER"

Enlarging Lantern.

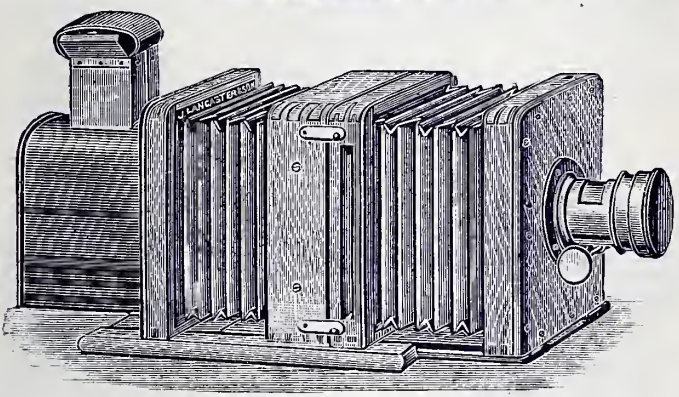
THIS LANTERN has a pair of our best Condensers, mounted in Brass, 3-wick Lamp, giving a brilliant light, producing excellent enlargements, and a new formula double Achromatic Objective and Carrier for Negative.

With our Enlarging Lantern first-class enlargements can be obtained with the greatest ease.



427.
With 5in. Condensers.
£3 3 0

428.
With 6in. Condensers.
£4 4 0

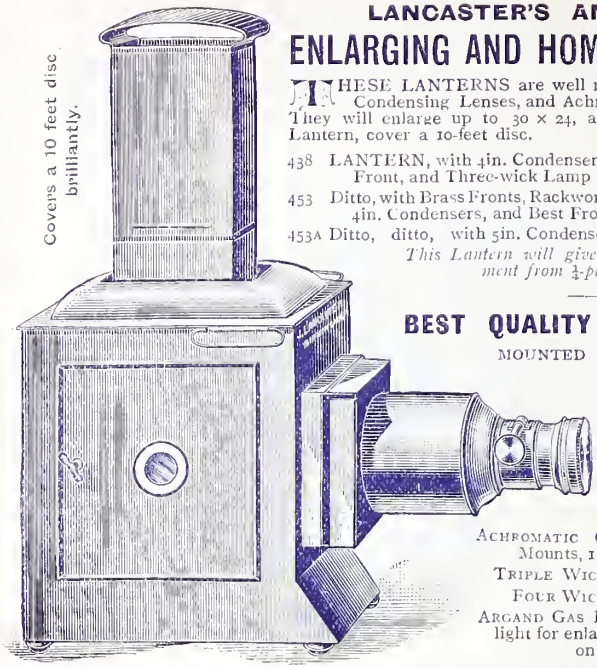


FIRST QUALITY ENLARGING LANTERN, with best Objectives, giving exquisite definition.

429	With 6in. Condensers	£6 6 0
430	,, 7in. ,, ...	8 8 0
431	,, 8in. ,, ...	9 9 0
432	,, 9in. ,, ...	10 10 0
433	,, 10in. ,, ...	12 12 0
434	,, 11in. ,, ...	14 14. 0
435	,, 12in. ,, ...	16 16 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,



LANCASTER'S AMATEUR ENLARGING AND HOME LANTERN.

THESE LANTERNS are well made, have best 4 inch Condensing Lenses, and Achromatic Object Lenses. They will enlarge up to 30 × 24, and will, as a Home Lantern, cover a 10-feet disc.

438 LANTERN, with 4in. Condensers, Achromatic Front, and Three-wick Lamp £1 11 6

453 Ditto, with Brass Fronts, Rackwork Adjustment, 4in. Condensers, and Best Front Lenses ... £2 2 0

453A Ditto, ditto, with 5in. Condensers £2 17 6

This Lantern will give a good crisp enlargement from ¼-plate Negative.

BEST QUALITY CONDENSERS.

MOUNTED IN BRASS.

4-in. ...	12/6
5-in. ...	21/-
6-in. ...	35/-
7-in. ...	50/-
8-in. ...	65/-
9-in. ...	80/-
10-in. ...	110/-
11-in. ...	130/-
12-in. ...	150/-

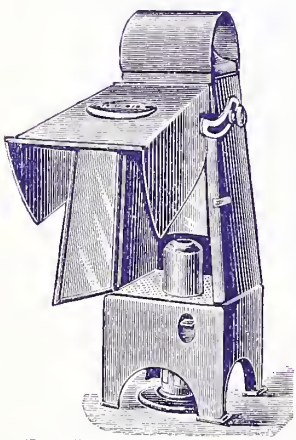
ACHROMATIC OBJECTIVES in Rack Mounts, 12/6, 15/-, 21/- each.

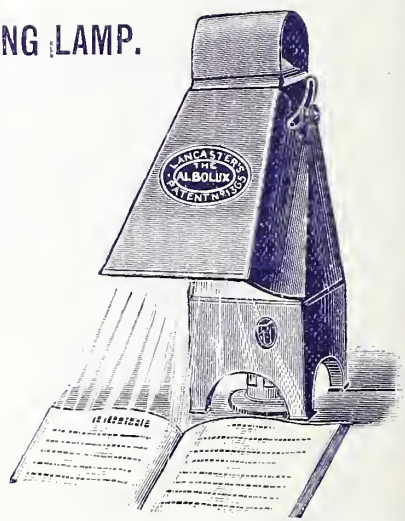
TRIPLE WICK LAMPS, 10/6 each.

FOUR WICK LAMPS, 13/6 each.

ARGAND GAS LAMP, giving beautiful light for enlarging purposes, fitted on Stand, 10/-

LANCASTER'S NEW READING LAMP.





THE "ALBOLUX" PATENT.

THIS Lamp carries a candle which burns for over two hours. It has parabolic reflector, ground glass screen, and shield reflector, giving a beautifully soft light on the manuscript.

"Albolux" No. 1 ... ... 5/- | "Albolux" No. 2, larger size, with bell, &c., 7/6

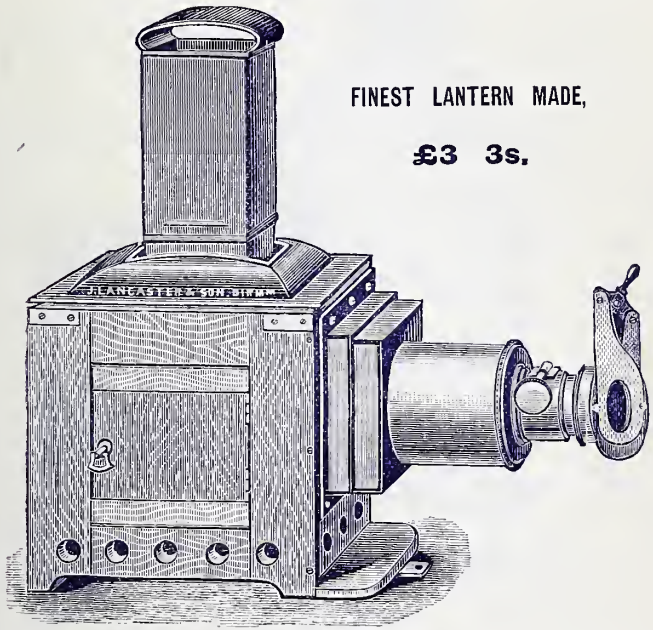
Candles, 1/- per dozen.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,

IMPROVED

1892 "Excelsior."



FINEST LANTERN MADE,

£3 3s.

No. 469.

THE NEW MODEL "EXCELSIOR" is made of Mahogany, Brass Bound, and has 4in. best Condensers, mounted in brass with Ventilation Apertures to prevent Condensing Lenses steaming during exhibition. Special Achromatic Front with large Back Combination, giving brilliant definition and covering well a twelve feet disc with crispness from centre to margin.

Our New Four-wick Lamp, with the light concentrated into the smallest possible space, and giving brilliant illumination in every part of a twelve feet disc; new system of ventilation, in which air currents enter between the wicks, producing maximum of light from Hydro-carbons burnt.

The whole packed in Polished Wood Case, with Handle, Lock and Key, £3 3s.

Our New Dissolver, giving the most perfect dissolving effects possible with a single Lantern, 5s.

New dissolving Slide to use with above, 3s. 6d.

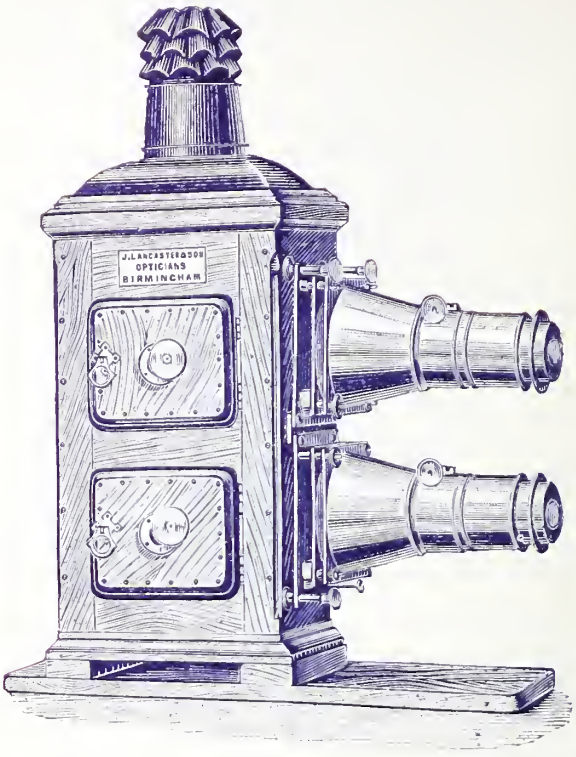
Achromatic Microscope, adaptable to any Lantern, with double combination power, &c., £1 1s.

Ditto, ditto, three powers, £2 2s.

Jet Tray for Limelight, 2s. Set of Apparatus for Limelight, to fit "Excelsior," £3 3s. and £5 5s.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON,



No. 472.

472—First Quality Mahogany Biunial, with best 4in. Condensers, Triple Achromatic Objectives mounted in best Brass Fronts, Cones and Sliding Tubes, giving a 20ft. disc at any distance from screen. In cabinet with drawers and space for all extras	£12	12	0
473—Pair Blow-through Jets, Cog Wheel Lime adjustment, Gas Bag, Board, Retort, Purifier, Dissolver, &c.	4	4	0
474—Ditto, Oxy-hydrogen Jets, Platinum Points, pair Bags, Boards, &c., complete	6	6	0
446—Rackwork Fronts, with 2in. Lenses	0	7	6
447—Achromatic Rackwork Fronts 12/6 15/-	1	1	0
448—Triple Combination Objectives, giving a 10 or 20ft. disc, at seven different distances, each set	2	10	0
449—Ditto ditto, with Negative Adjusting Lens, to give a 10 or 20ft. disc at *any* distance from screen	2	15	0
450—Tin Bodies for Lanterns, from	0	10	0
451—Mahogany Bodies for Single Lanterns	0	15	0
452—Ditto ditto, for Biunials, from..	1	15	0
Oxygen Mixture, per lb.	0	1	0
Lime Cylinders, per dozen	0	3	6

COLMORE ROW, BIRMINGHAM.

THE LONDON AGENCY

FOR

Lancaster & Son's

PHOTOGRAPHIC GOODS

IS AT

ST. BRIDE'S STORE,

86 & 87, FLEET STREET, E.C.

LARGE STOCK KEPT. : : : LISTS FREE.

CATALOGUE, FOUR STAMPS.

DRY PLATES, CHEMICALS, &c.

AT LOWEST PRICES.

FOR FULL PARTICULARS SEE PRECEDING PAGES.

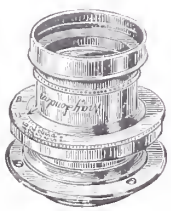
WRAY'S

Photographic Lenses,

With Iris Diaphragm or Ordinary Stops.

ALUMINIUM OR BRASS SETTINGS.

—*—

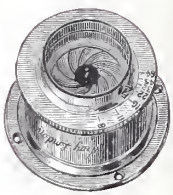


W. WRAY,

OPTICIAN,

North Hill, Highgate,

LONDON, N.



Telegrams—"WRAY, HIGHGATE, LONDON."

—*—

Prices—RAPID RECTILINEAR LENSES.

Size ...	4¼ x 3¼	5 x 4	6½ x 5	8 x 5	8½ x 6½	10 x 8	12 x 10	15 x 12	18 x 16
Waterhouse Diaphragms .	£2 5	£2 10	£3 10	£4 0	£4 10	£6 0	£8 0	£10 10	£14 0
Iris Diaphragms ..	3 0	3 5	4 5	4 15	5 5	6 15	9 0	11 15	15 10
Aluminium Settings extra ...	0 15	0 15	1 0	1 5	1 10	1 15	2 5	3 10	5 0

The full aperture of these Lenses is *f*/8, excepting the two first, which have double this aperture = *f*-5.65.

Prices—WIDE-ANGLE RECTILINEAR LENSES.

Approximate Angle included, 90 degrees. Largest Aperture, *f*/16.

Focus	3in.	4in.	5in	6in.	7in.	8in.	9in.	10in.	12in.	15in.	18in.	21in.
Price ...	£2 10	£2 15	£2 17 6	£3 0	£3 15	£4 10	£5 5	£6 0	£7 0	£8 0	£10 0	£12 0

Aluminium Settings up to and including 10 inch focus, 15/- extra; 12 inch to 18 inch focus, £1 extra; and 21 inch focus, £1 5s. extra.

The sizes from 3 to 10 inch fit one flange, and the tubes being the same size the lenses are interchangeable. Up to and including 9 inches focus, they are fitted with Revolving Stops; beyond these sizes Waterhouse Stops are used, but the Iris Diaphragm, 15s. extra, is strongly recommended for all sizes above 7 inches.

WIDE-ANGLE LANDSCAPE LENSES.

Size ...	5 x 4	6½ x 5	7½ x 5	8½ x 6½	10 x 8	12 x 10
Focus	5in.	6¼in.	7¼in.	9in.	10in.	12in.
Price	£1 15	£2 5	£2 10 0	£3 0	£3 15	£4 10
Aluminium Settings extra	0 15	10	1 26	15	1 15	2 5

NARROW-ANGLE LANDSCAPE LENSES.

FOR DISTANT VIEWS.

Size ...	5 x 4	6½ x 5	7½ x 5	8½ x 6½	10 x 8	12 x 10	15 x 12
Focus	7½in.	9in.	10in.	12in.	15in.	18in.	21in.
Price ...	£1 10	£1 15	£2 0 0	£2 10	£3 5	£4 0	£4 15
Aluminium Settings extra ...	0 15	1 0	1 26	1 5	1 15	2 5	3 0

The Landscape Lenses are fitted with Rotating or Waterhouse Stops.

Iris Diaphragms, 15/- extra.

Special Lenses for Hand Cameras.

LARGEST WORKING APERTURE, F/8.

	Waterhouse Stops.	Iris Diaphragms.
4½in. focus	£2 5 0	£3 0 0
5in. ,,	2 5 0	3 0 0
5½in. ,,	2 5 0	3 0 0
6in. ,,	2 10 0	3 5 0
Focussing Jacket, with rack and pinion		0 15 0

Single Stereo Lenses.

FULL WORKING APERTURE, F/11·3.

5in. focus, 1½in. diameter, Rotating Stops .. .. .. £2 10 0 per pair.
Pair 7in. Lenses in Case, to fit the 5in. Mounts .. .. 1 16 0 ,,

Gasket Lenses.

Three Landscape Lenses, fitting one Mount, having Iris Diaphragm, with separate scale of apertures for each Lens.

For Plates, 5 ×4, Lenses 5in., 7½in., and 10in. focus £5 5 0
,, 6½×5, Lenses 6½in., 9in., and 12in. focus 6 5 0
,, 8½×6½, Lenses 9in., 12in., and 15in. focus 8 5 0

Lantern Projection Lenses.

WITH RACK AND PINION.

6in. focus, aperture nearly f/3 .. .. £4 10 0
9in. ,, ,, fully f/4 .. .. 5 10 0
6 × 9in. focus Lenses, fitting our Rack Jacket £9 10 0

These Lenses have a remarkably flat field and are corrected for the actinic rays.

—*—

TERMS.—The Prices of Photographic Lenses are subject to a Discount of 10 per cent. for Cash with Order. Price Lists free.

W. WRAY, OPTICIAN,

MANUFACTURER OF

Astronomical and Terrestrial Telescopes, Microscopes, Objectives, Eyepieces, Photographic Lenses, etc.

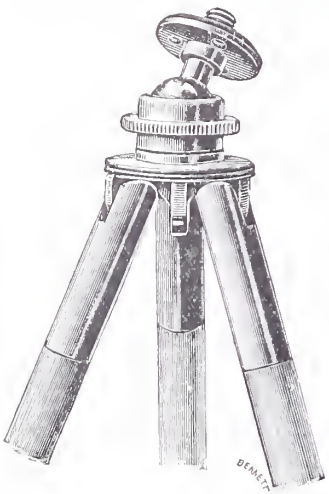
Illustrated Catalogue for Stamp.

NORTH HILL, HIGHGATE, LONDON, N.

LIGHT BAMBOO STANDS.

(SELF-ADJUSTING TRIPOD HEAD.)

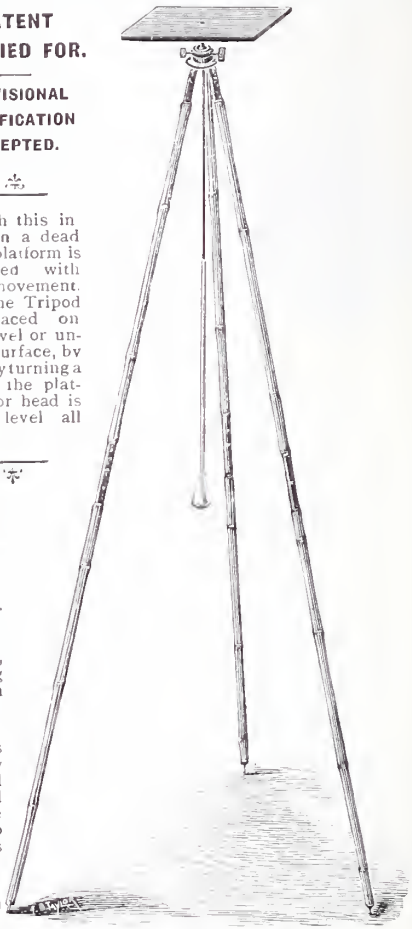
The Greatest Novelty yet introduced. **Eight Thousand already Sold.**



PATENT APPLIED FOR.

PROVISIONAL SPECIFICATION ACCEPTED.

With this invention a dead level platform is obtained with one movement. Let the Tripod be placed on any level or uneven surface, by merely turning a screw the platform or head is dead level all ways.



No.	Weight.	Price.	If Legs Jointed (Screw Joints).
1.—Rigid Head	12 oz.	5/-	
2.—Do., hole for T Screw	16 oz.	6/-	Each Joint Extra. 9d.
3.—Do. do.	20 oz.	7/-	
4.—Ball and Socket Joint	13 oz.	6/-	
5.—Do. do.	21 oz.	7/6	
6.—Do. do.	25 oz.	11/6	

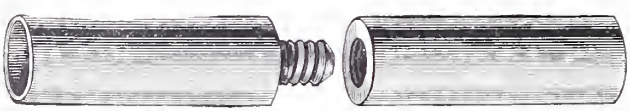
If fitted with Self-adjusting Arrangement, with Clamped Table 6 x 5in., and Adjusting Rod or Plumb, which will slide up when travelling. Extra—

No. 4, 3/- No. 5, 5/- No. 6, 6/6.

In Nos. 5 and 6 the Ball and Socket Joint is removable, and can then be used with ordinary T screw. Nos. 2 and 3 are actually Nos. 5 and 6 with this part removed. If jointed any Stand can be sent Parcel Post If not otherwise ordered, all Stands are made about 47in.; no extra charge if made higher. Jointed Stands post free.

Any Stand sent on Approval against Cash.

No. 5 Ball and Socket Joint, to use with ordinary Tripod head, 3/6. No. 6 do., 4/-

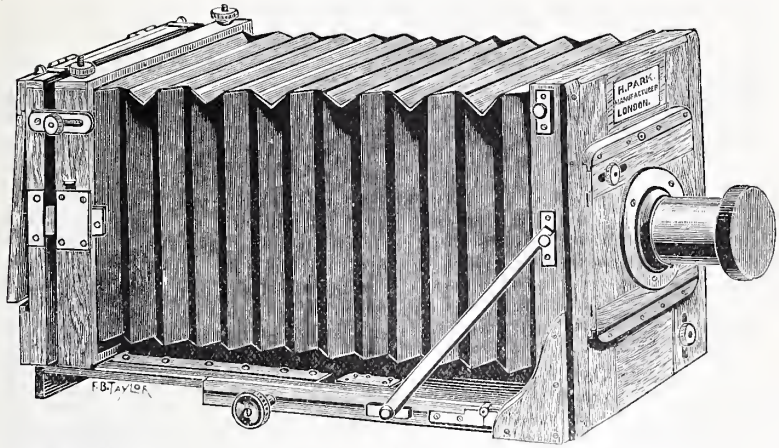


Of all Photographic Dealers, or of the Manufacturer:

H. PARK,

5, STATION BUILDINGS, ACTON STREET, KINGSLAND ROAD, LONDON, N.E.

Telegraphic Address—"PERNICITY, LONDON." Cheques—LONDON & COUNTY BANK.



PARK'S IMPROVED LONG-FOCUS CAMERA. The most Perfect, Durable Instrument yet devised. Simplicity and Strength.

PRICE, WITH ONE DOUBLE SLIDE:

For Plates. Inches.	Horizontal and Vertical.	Square.
6½ x 4¾	£6 0 0	£6 0 0
7½ x 4½	6 0 0	6 6 0
7½ x 5	6 5 0	6 10 0
8½ x 6½	7 0 0	7 13 0
10 x 8	8 10 0	9 0 0
12 x 10	9 15 0	10 2 0

For Plates. Inches	Horizontal and Vertical.	Square.
15 x 12	£12 0 0	£12 16 0
18 x 16	—	16 10 0
20 x 16	—	17 15 0
22 x 18	—	18 5 0
24 x 20	—	21 0 0

For Plates. Centimètre.	Price.
9 x 12	£5 5 0
12 x 15	6 6 0
13 x 18	6 10 0
12 x 20	6 18 0
15 x 21	7 15 0
18 x 21	7 18 0
15 x 22	7 18 0
18 x 24	8 0 0

For Plates. Centimètre.	Price.
21 x 27	£9 10 0
24 x 30	9 15 0
27 x 33	10 10 0
27 x 35	11 0 0
30 x 40	13 0 0
40 x 50	16 10 0
50 x 60	21 0 0

EXTRA DOUBLE DARK SLIDES.

Inches.	Price.	Inches.	Price.	Inches.	Price.
4¼ x 3¼	£0 13 0	8 x 5	£0 18 6	15 x 12	£2 0 0
5 x 4	0 13 6	8½ x 6½	1 0 0	18 x 16	3 0 0
6½ x 4¾	0 15 0	10 x 8	1 4 0	20 x 16	3 6 0
7¼ x 4½	0 18 0	12 x 10	1 10 0	22 x 18	3 12 0

24 x 20 ... ... £3 16 0

All made of specially seasoned Wood, selected with greatest care, and are made on the Premises.

Telegraphic Address—"PERNICTY, LONDON."



VICTORIA CAMERAS



Special Medal Awarded.

Are well known.

Special Medal Awarded.

HENRY PARK, Practical Photographic Apparatus Manufacturer.

(Seven Years with P. MEAGHER, Eight with G. HARE.)

MANUFACTORY—5, STATION BUILDINGS, ACTON ST., KINGSLAND RD., LONDON, N.E.

BANKERS—LONDON AND COUNTY.

THE BIRMINGHAM PHOTOGRAPHIC CO.,

LIMITED,

99 & 100, GLADSTONE ROAD, SPARKBROOK,

BIRMINGHAM.

"CRITERION" BROMIDE CARDS.

No daylight required. No mounting.

C.D.V., 1/6; ¼-pl., 1/9; Cab., 2/6; ½-pl., 3/-; ¼-pl., 6/6.

"CRITERION" BROMIDE OPALS.

BEST AND CHEAPEST.

"CRITERION" Printing-out OPALS.

Perfect results. Easy to work.

KALLITYPE.

Sample sheet matt, 26 × 20, 1/3.

,, ,, Alb., 22 × 17, 1/2.

Post free.

Prices in Packets of 24 pieces, POST FREE.

Matt, ¼-pl., 11d.; ½-pl., 2/-

¼ pl., 3/6, &c.

Alb., C.D.V., 1/-;

½-pl., 1/3-;

Cab., 2/-;

½-pl., 2/6

&c., &c.

"CRITERION" PRINTING-OUT PAPER (Gelatino-Chloride) The Latest, Best and Cheapest.

Size of Sheet, 24 × 19 (20 per cent. larger than albumenized paper), 15/- per quire, White or Pink. Two sheets (packed in tube), 1/9, post 3d. extra. Six sheets 4/3, post 3d. extra. Cut up C.D.V. (2 doz. pieces), 9d.; ¼-pl., 7d.; Cab., 1/-; ½-pl., 1/3 per doz. pieces, postage extra.

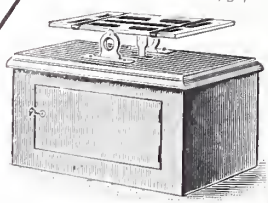
Telegrams: "Kallitype," Birmingham.

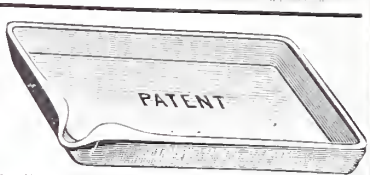
PATENTED SPECIALITIES.

AUTOMATIC ROCKERS.

For ½-pl. & under, 13/6, 17/6

For 15 x 12 & under, 30/-





Non-spilling. Easy pouring.

Patent "Rim" and Patent "Lip" Developing Dishes.



THE GOLDEN VIGNETTER.

For Portraits & Landscapes. A perfect vignetting mask.

3 assorted ¼-pl. .. 1/-

3 ,, ½-pl. .. 1/6

3 ,, ¼-pl. .. 2/-

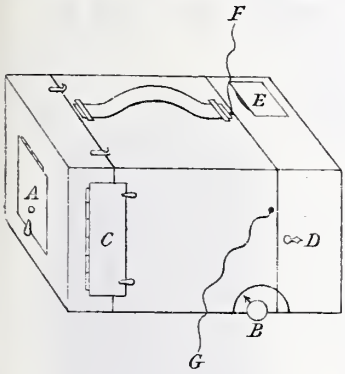
In ordering, please say whether for Portraits or Landscapes.

Our Goods may be had of all Photographic Dealers, or direct.
All Goods postage or carriage EXTRA, unless otherwise stated.

SEND FOR FULL ILLUSTRATED CATALOGUE.

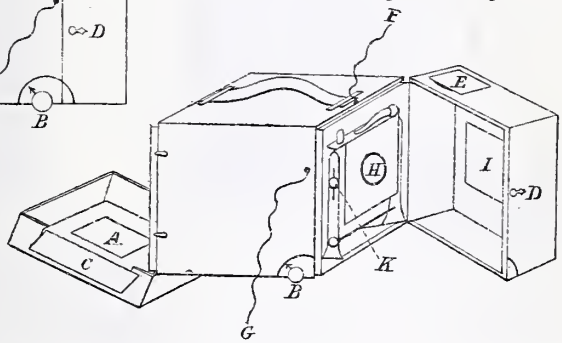
BROOKER'S
UNIVERSAL Prize Medal CAMERA

(PATENTED).



CLOSED.

A.—Hinged Door for Focussing.
B.—Milled Head, Pointer and Dial for Focussing.
C.—Door for inserting Dark Slides.
D.—Key Hole.
E.—View Finder.
F.—String for releasing Shutter.
G.—String for Setting Shutter.
H.—Shutter where Lens is screwed on.
I.—Door for exposing through.
K.—Milled Head of Swing and rising front.



SHOWING METHOD OF OPENING. (Front and Back also take right off.)

This Camera has been designed to satisfy the requirements of those who desire a Camera—and one only—of best workmanship, which has all the movements of an ordinary Camera, combined with all those of a hand Camera.

ADVANTAGES.

Outside measurement, $8\frac{3}{4} \times 6\frac{1}{2} \times 5\frac{3}{4}$. Takes any lens from $3\frac{1}{2}$ to 8in., equiv. focus.

Shutter, always ready (behind the lens), which can be used or not as required.

Has all the movements of an ordinary Camera, Focussing Screen, rising and falling front swing front for architectural or street views, and dark chamber, doing away with use of cloth.

Has dark slides, the shutters of which pull right out, perfectly light tight, and a plate may be carried about for hours, ready for exposure, without fear of fogging.

It has Dial and Index, so that when used as a Hand Camera, customer may mark for either a fixed focus or for different distances to suit his own lens, a view finder being also provided.

The Dark Slides will go inside Camera, and as there is lock and key provided, the Camera may be left anywhere without fear of plates being damaged by inquisitive persons.

For enlarging by daylight, either through shutter of darkened room or in conjunction with Enlarging Camera, it is admirably adapted; the Ground Glass of focussing screen may be removed and negative to be enlarged inserted in its place.

PRICE OF CAMERA and Three Double Dark Slides, including Shutter, View Finder, Focussing Screen and Screw for use on Stand either way up:—

$\frac{1}{4}$-plate, **£6 6s.** $\frac{1}{2}$-plate, to order, **£9 9s.**

Send for full descriptive Pamphlet to

A. BROOKER, PHOTOGRAPHIC CHEMIST, 52a, ROBERTSON STREET, **HASTINGS**

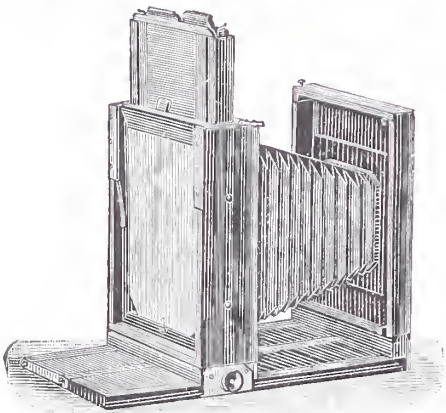
(CORNER OF CAMBRIDGE ROAD).

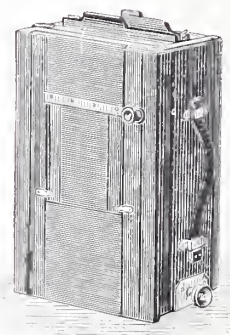
Visitors to Hastings and St. Leonard's may here obtain all Requisites, together with use of Dark Room.

F. K. HURMAN & CO.,

2, ST. NICHOLAS BUILDINGS,

NEWCASTLE-ON-TYNE.





F. K. H. & Co. now offer a perfect ½-plate Camera, size, when folded with one double dark slide and leather handle, 9¾×7×4in.; weight of same, with tripod stand, 5½lb.

A	Price of same with tripod stand and one double slide	£2 10 0
B	Price of A with perfect single landscape lens	3 0 0
C	Price of A and perfect R R lens and stops	3 18 0
D	Price of A and perfect R R lens with Iris diaphragms	4 4 0

Extra Double Dark Slides, 7/- each.

The Camera will take pictures either way of plate, has rising front, rack and pinion, and lock-nut to make secure.

F. K. HURMAN & CO. SUPPLY

THE FINEST COLLOD CHLOR PAPER

MADE. PRICES ON APPLICATION.

2, ST. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.

Telegraphic Address—"Hurman, Newcastle-on-Tyne."

PRIZE MEDALS.

Liverpool International Exhibition, 1886.

Photographic Exhibition, 1888.

ARCHER'S IMPROVED

OPTICAL MAGIC LANTERNS

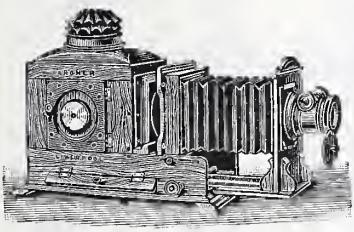
TWO PRIZE MEDALS AWARDED.

BOTH OIL AND LIMELIGHT.

Have proved by public competition to be superior to all others.

See Reports in the *British Journal of Photography*.

Used at the Walker Art Gallery Photographic Exhibitions (1888 and 1891) with such unprecedented success; "Sunlight" Soap Works; New Gladstone Hall; Liverpool Photographic Association; Liverpool Seamen's Friend Society; Liverpool Agent Society for Promoting Christian Knowledge; many Temperance Societies, &c.



The "Ideal," the Lantern of the future.

The "Ideal" Lantern.

THE LANTERN OF THE FUTURE.

See Enthusiastic Testimonials from Paul Lange, Esq., F. Anyon, Esq., G. E. Thompson, Esq., The Manchester Camera Club, &c.

Our New Patent "IDEAL" Dissolver for Single Lanterns, Price 25/-

Improved Blow-thro' Safety Jet, 16/-

THE "PHOTINUS" (Registered), the most powerful Oil Lantern in the world, **Price £4 4/-**

Full-sized Lanterns from £1 1s. to £100.

Illustrated Price Lists, many Novelties, post free One Stamp.

Pure Oxygen Gas, compressed in Steel Cylinders.

DISSOLVING VIEWS & SLIDES OF EVERY DESCRIPTION

MADE TO ORDER BY OUR OWN ARTISTS.

Maps, Drawings, &c., Copied for Lantern Slides in superior style.

One of the Finest and Largest Stocks of Slides in the Kingdom at most reasonable prices.

ARCHER & SONS,

LANTERN SPECIALISTS & MANUFACTURERS,

43 to 49, LORD STREET, LIVERPOOL.

ESTABLISHED 1848.

Makers of the New Extraordinary Lantern for the "Sunlight" Soap Works.

Dark-room for trying Lanterns on the premises. Workshops on the premises.

JAMES MOORE,

18, VAUXHALL STREET, BIRMINGHAM,

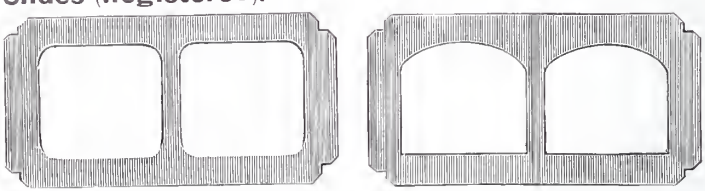
SOLE BRITISH MANUFACTURER OF

FERROTYPE PLATES,

IN BLACK AND CHOCOLATE.

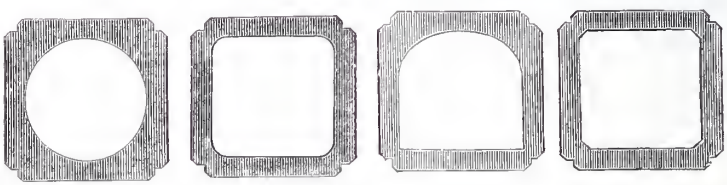
Matts, Preservers, Combinations, Trays, Albert Trays, Cases, &c.

New Metal Frames, Matt and Preserver combined, for Transparencies, Magic Lantern and Stereoscopic Slides (Registered).

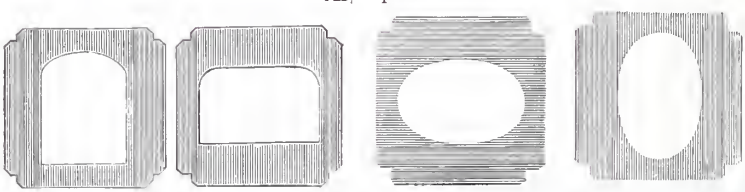


Packed in 1 dozen boxes, price 2/6. Size 6½ by 3¼, and 6¾ by 3¼.

MAGIC LANTERN SLIDES (Regd.)



Price 12/- per Gross.

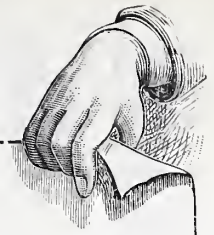


Landscape and Statuary, price 12/- per Gross.

ADVANTAGES.—Matt and Preserver combined. No Black Paper Matt required. No breakage at the corners. The Apertures, Round, Cushion, or other shapes, are always in the centre of the glass. Decidedly the best protection against the breakage of glasses that has ever been produced.

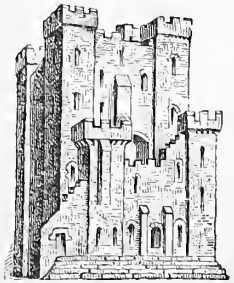
THE CHEAPEST HOUSE IN THE TRADE.

FOR HOME AND EXPORTATION.



THE CASTLE PLATES SOLE MAKERS: MAWSON & SWAN

From RANGOON, under date of February 6th, 1892, we have received the following unsolicited testimony from a large Wholesale Dealer:—



TRADE MARKS.)

THE CASTLE

"Better Plates cannot be had "for any money. They are all "that could be desired."

MAWSON & SWAN,

LONDON & NEWCASTLE-ON-TYNE.

PLATT & WITTE

(Formerly E. G. PLATT),

MANUFACTURERS OF

OPTICAL LANTERNS,

PHOTOGRAPHIC, BRASS AND ALUMINIUM FITTINGS,

BELLOWS, TENTS, FLASH LAMPS, CAMERAS,

Wholesale & Export. Estimates given for large quantities.

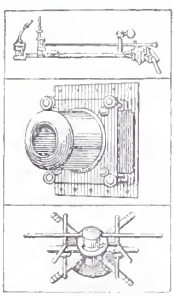
DESIGNS WORKED OUT. CASTINGS SUPPLIED.

PATENTEES AND SOLE MANUFACTURERS OF

THE NEW "PATENT DISC ADJUSTMENT"

FOR OPTICAL LANTERNS.

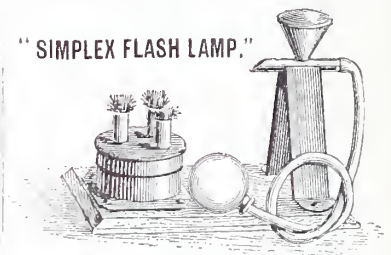
ALL ACCESSORIES SUPPLIED.



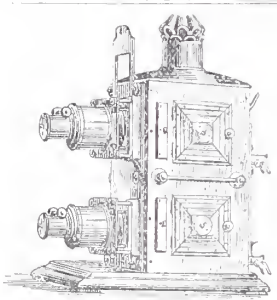
	Each.
High Pressure Jet...	16 6
Safety Blow-through Jet	11/-
Single Lantern Front	30 -
Dissolvers ...	15/-

ALL WARRANTED.

"SIMPLEX FLASH LAMP."



Price complete, Ball Tube and Magnesium Powder for 50 explosions, **3/-** each.



This lantern is of the very best manufacture, and is the cheapest of its kind in the market. All the brass work is well finished. Parts made to unscrew, not riveted or burnished in.

It has Front Lenses, with wide back combination, Curtain, 4in. Condensers, Brass Tinter Doors at sides of body, Panelled and Moulded Doors, Brass Sight Holes, Side Handles, Back Supply Pipes and Star Dissolver, Blow-through Jets, Trays, and all complete in Wood Case, Polished, Two Locks, Handles at Sides.

PRICE .. .. .. £13 6s.

Birkbeck Road, Ridley Road, Dalston,

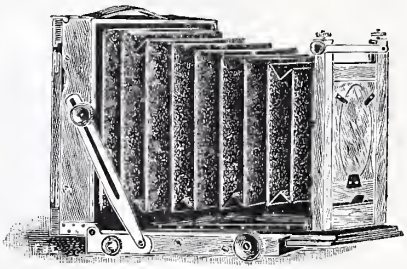
LONDON.

WATKINSON & CO.

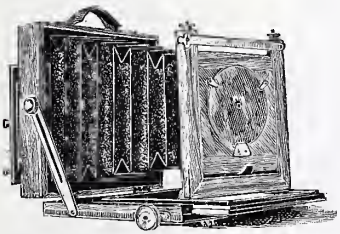
Manufacturers of Photographic Cameras.

TRIPODS.

SCIENTIFIC AND LABORATORY APPARATUS.



The "Popular" Camera.



The "Airedale" Camera.

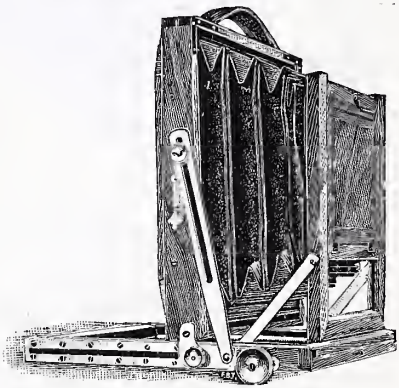
PHOTOGRAPHIC RACKS AND PINIONS.

BELLOWS,

Milled Screws and Camera Fittings.

Special attention given to work from drawings.

Before ordering see Catalogue (post free one stamp).



The "Minim" Camera.

NEW BRIGGATE, LEEDS

STOP!

No Photographer's Outfit is complete without

WOOD'S PRIZE MEDAL

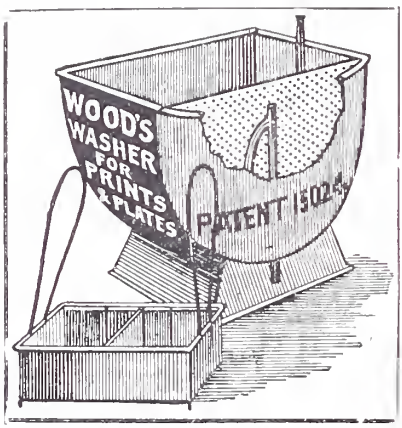
Washer AND Adjustable Rack

ACKNOWLEDGED BY ALL TO BE

THE VERY BEST IN THE MARKET.

THE MOST RAPID HYPO ELIMINATOR.

PLATES, FIFTEEN MINUTES. PRINTS, THIRTY MINUTES.



No Bruising or Tearing of Prints.

Non-æration of Water, consequently no Air Bells.

Prints always on the move. Automatic Shut-off.

Contaminated Water drawn off from the bottom.

PRICES.

To Wash all Prints and Plates up to

Whole Plate Washer **12/6**

Rack **4/6**

(Adjustable for nine sizes.)

12 × 10 Washer **22/6**

Rack **8/-**

Adjustable for twelve sizes.

Large Washer, suitable for professionals. Strong and well-made of Galvanized Iron. Will wash 350 Cabinets at one time and all Prints and Plates up to 15×12.

Price—Washers, **42-**; Rack, **13/6**.

Turn the Water on, the Washer does the rest.

TO BE OBTAINED FROM ALL DEALERS, OR FROM

WOOD'S WASHER CO.,

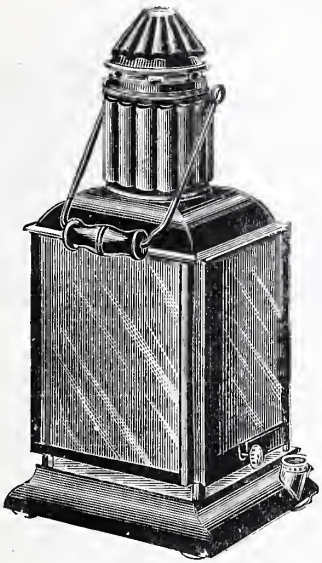
25, CUMBERLAND STREET, LIVERPOOL.

LUCAS'S

UNIVERSITY LAMP

THE BEST DARK-ROOM LAMP EVER PRODUCED.
BURNS PETROLEUM WITHOUT A CHIMNEY.

WRITE FOR LIST OF THIS AND OTHER LAMPS.



WRITE FOR LIST OF THIS AND OTHER LAMPS.

AFTER TWO YEARS.

[COPY.] *Glasgow Technical College, March 14th, 1892.*

Dear Sirs,—I have used your "UNIVERSITY" Lamp for two years, and like it better than any other dark-room lamp I have tried.

I like plenty of light, so that I can see what I am doing, and this your lamp gives, whilst it is quite safe to work with.

The absence of the troublesome chimney is a great advantage, and, as the lamp burns without smoke or smell, I consider it very satisfactory. *Yours truly,*

(Signed) *A. HUMBOLDT SEXTON,*
F.I.C., F.R.S.E., F.C.S.

JOS. LUCAS & SON, Little King St., BIRMINGHAM.

ESTABLISHED 1885. Telegrams: "Bolastype, London.

Highest Awards International Exhibition.

CRYSTAL PALACE, 1891,

GLASGOW, 1891. LEEDS, 1891.

S. B. Bolas & Co.

PHOTOTYPE PRINTERS,

FOR THE PRODUCTION OF

PHOTOTYPE PRINTS

Supply a good Negative, Photograph of Drawing.

Large Photos., Drawings, &c., can be reduced to any size.

Phototype Prints are most suitable for Engineers' Catalogues.

Phototype Prints are the best for reproducing Portraits, Landscapes, and all subjects where much detail is required.

They are permanent in colour, and can be produced from 100 copies upwards, and in any size from C. de-V. to 28in. by 22in.

11, Ludgate Hill, E.C.

SEND FOR ESTIMATES AND SPECIMENS.

TYPE MATTER REQUIRES A SECOND PRINTING.

See Section viii.

SEND POSTAL ORDER FOR

THE GREATEST WONDER OF THE AGE!

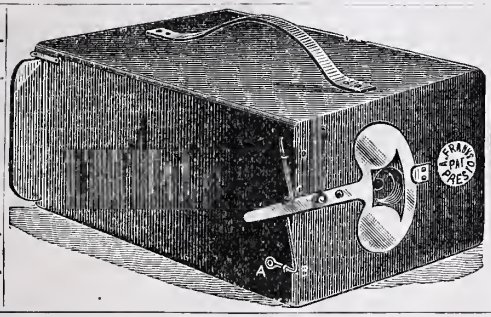
TEN THOUSAND ALREADY SOLD.

THE "PRESTO"

DETECTIVE OR HAND CAMERA.

A. FRANKS, Sole Patentee and Manufacturer.

PRICE 10/6



PRICE 10/6

Complete with Chemicals and Plates, Double Dark Slide, Time or Instantaneous Shutter of a most ingenious and simple construction.

NO COMPLICATIONS. A CHILD CAN USE IT.

Size of Picture: QUARTER PLATE, 4¼ in. × 3¼in.

THE "PRESTO" CAMERA will produce every kind of Picture, Views, Groups, and Moving Figures, any distance over three yards, the lens being achromatic and always in focus. The case is made of ebonised wood.

Do not think because the price being only 10/6 that the "PRESTO" is a useless Camera (as most cheap Cameras are). Photographers have tested the "PRESTO," and pronounced it a most PRACTICAL AND SUCCESSFUL CAMERA.

EACH CAMERA GUARANTEED TO TAKE A PERFECT PICTURE.

This Camera recommends itself to every one for its simplicity and portability, weighing only one pound, and it will take quarter plates, carte-de-visite, and lantern slides, and will cover each plate to the extreme edge.

A. FRANKS' COMPLETE PRINTING ACCESSORIES

FOR THE PATENT "PRESTO" CAMERA,

Comprising Ruby Lamp, with Night Light; Bottle of Gold Toning Solution; ¼-plate Printing Frame; Packet Ready Sensitised Paper, 28 pieces, ¼-plate; Two Vulcanite Dishes; One Porcelain Dish; 50 ¼-plate Mounts; Box of Hyposulphite of Soda, for Fixing.

PRICE, COMPLETE - - 7/-

A. FRANKS, 95, Deansgate, Manchester.

ILLUSTRATED CATALOGUES POST FREE.

A. FRANKS' PATENT

PRESTO CAMERA.

PRICE 21/- COMPLETE



Presto Hand Camera No. 2.

"PRESTO" No. 2.

THE enormous success attained by my No. 1 "PRESTO" HAND CAMERA brought numerous suggestions from purchasers as to the advisability of placing a camera in the market which would enable a number of dry plates to be carried, and thus facilitate taking photographs without repeated visits to the dark-room.

Acting upon such suggestion, I now bring before the public my No. 2 "PRESTO," which contains six Dark Slides, Focussing Screen, and View Finder. The size is very little larger than No. 1, being 10 by $5\frac{1}{2}$ by $4\frac{1}{2}$, and the addition of weight is very trifling.

This Camera will recommend itself to tourists and others who wish to take outdoor views. By simply changing the slides six photos can be taken with it; another feature being that the Time and Instantaneous Shutter is completely hidden, thus making it perfectly secret.

Sent to any address, Carriage Paid, in Great Britain, on receipt of Postal Order for

21/-

A. FRANKS, 95, Deansgate, Manchester

ILLUSTRATED CATALOGUES POST FREE.

A. FRANKS'

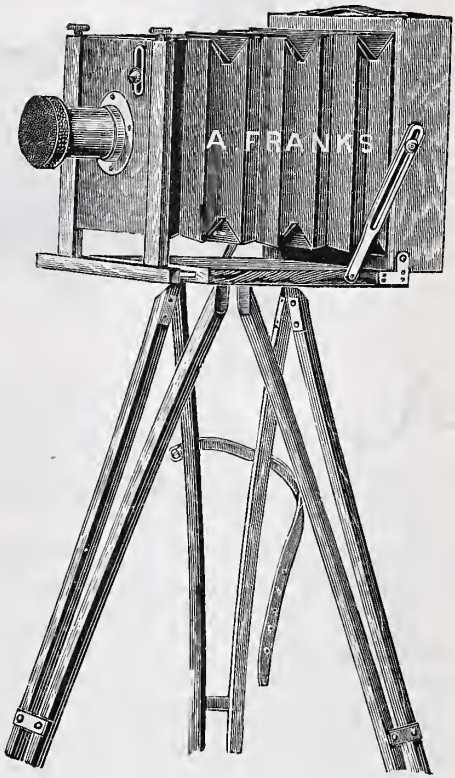
LATEST SPECIALITY.

A. FRANKS' HALF-PLATE MAHOGANY LONG-EXTENSION CAMERA, Leather Bellows, Rising Front, Swing Back, Reversible Frame, **ONE** Best Double Dark Slide, A. Franks' **RAPID DOUBLET LENS** with Waterhouse Diaphragms, **IMPROVED TRIPOD STAND, GUARANTEED** to be the **BEST VALUE** in the trade.

It is an utter impossibility to take a first-class instantaneous picture with the ordinary **ADVERTISED** Single Lens, but the Lenses given with above Sets are specially adapted for this work.

I Guarantee this set to be infinitely superior, in every respect, to Half-plate outfits sold by other dealers, at 50% higher price.

Price £4 4s.
COMPLETE.



Well Packed and sent to all parts of Great Britain on receipt of Postal Order.

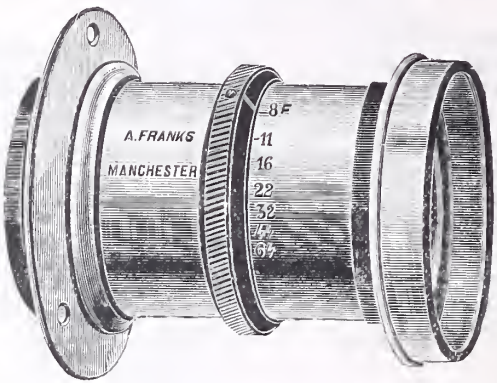
A. Franks,

95, DEANSGATE, MANCHESTER.

ILLUSTRATED CATALOGUES POST FREE.

A. FRANKS' CELEBRATED

Iris Diaphragm Lenses



A. FRANKS highly recommends his **IRIS DIAPHRAGM LENSES.** They have been largely used for all kinds of work, and have given universal satisfaction Each Lens is guaranteed. The Lenses are composed of two exactly symmetrical cemented combinations of the finest quality. They are free from distortion, giving perfectly rectilinear lines, and will work with the full aperture of the Lens, *f*/8.

They are the best form of Lens for all enlarging and copying purposes; also for architecture, groups, landscapes, and every description of outdoor photography, and can be used with the quickest shutters in the market, giving sharp definition up to the edge of the plate.

The back combination of these Lenses can be used singly as an ordinary landscape lens of about double the focus. The front lens having been removed, the hood can be screwed into the main tube of the lens.

There is no loss of time and temper, usually arising when loose stops get lost or mislaid. By rotating a ring on the tube of the lens any size stop can be obtained, the tube being engraved with a scale (as shown by illustration), which represents size of stop formed by the IRIS DIAPHRAGM working from *f*/8 to *f*/64.

Price.

¼-plate, £1 7s.; ½-plate, £1 12s. 6d.; 1/1-plate, £2 7s. 6d.

Sent post free to all parts of Great Britain on receipt of Postal Order.

A. FRANKS, 95, Deansgate, Manchester

ILLUSTRATED CATALOGUE POST FREE.

G. W. WILSON & CO.

2, ST. SWITHIN STREET,

ABERDEEN, SCOTLAND,

Send post free, on receipt of address,

CATALOGUES OF THEIR PUBLICATIONS

AS NOTED BELOW.

English Series. Scottish Series.

Gibraltar & South of Spain Series.

Morocco & Tangiers Series.

24 × 18 Permanent Series (FOR FRAMING).

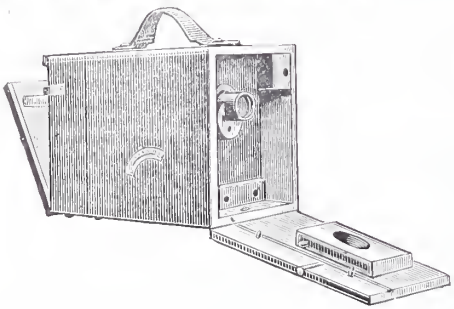
Permanent Animal Studies.

AND Lantern Slide Sets.

Including "The Holy Land," "1,000 Miles up the Nile," "The Giant's Causeway," "London," "English Cathedrals," "The Highlands and Lowlands of Scotland," "Cloud and Water Effects," "The Alhambra," "Animal Studies," "The Shakespeare Country," "The British Army," "The Architecture of England and of Scotland," "Antiquities at Athens," "Hawaii: The Paradise of the Pacific," "Sports and Athletics," "Snow Scenes," "Kingsley's Home, Eversley," "Tippoo: A Tale of a Tiger," "The Demon Cat," "Kamdene, Barnsburie, and d'Alston's Tour in the North," "The Riviera," etc., etc.

MILLER'S PATENT

Adelphi Hand Camera



IS pronounced the most simple and most practical Hand Camera ever yet offered to the public. There is no possibility of any part getting out of order, there being no intricate mechanism, no bolts, slides, thumb or push presses, no spiral springs, and no complications of any kind One movement removes and stores the plates after exposure, and there is no possibility of the plates falling edgewise or wrong side up. They can only fall in the proper position.

The "Adelphi" Hand Camera is also arranged for any kind of work, either time or instantaneous. Either plates or films may be used at will.

It is fitted with a multiplied focussing register, thereby getting over the difficulty of mistaking one distance for another.

The universal advantages of the "Adelphi" Camera over all other cameras are freely admitted by the best authorities in photography. Its simplicity in working and accurate work ensure it the undivided admiration of all who practise hand camera work.

PRICE, for ¼-plate complete, with R.R. Lens, View Finder, &c., £4 10 0

,, 5×4-plate ,, ,, ,, ,, £5 10 0

And each Camera GUARANTEED PERFECT when sent out.

ONE OF MANY TESTIMONIALS.

1B, Cooper Street, Manchester,

Mr. Miller. October 20th, 1891.

Dear Sir,—I have to congratulate you upon the efficiency of your "Adelphi" Hand Camera. Since purchasing the same I have exposed about 30 dozen of plates, and I am more than satisfied with the negatives obtained. Without any difficulty I am able to obtain with its aid 12 good negatives from every dozen exposures. I feel personally much obliged to you for having introduced the apparatus to me, and I have the utmost confidence in recommending it to any amateur as the most satisfactory Hand Camera in existence.

I am, dear sir, yours truly, R. O. GILMORE

(Hon. Sec. Manchester Amateur Photo Society).

Miller's Stereoscopic Magazine Hand Camera

Is also a great success It is the only Stereoscopic Magazine Hand Camera in the market, and is worked exactly on the same principle as the "Adelphi" Hand Camera. Quotations for other makers' Lenses, and further particulars on application to

T. MILLER

141, Broughton Road, SALFORD.

Fig. 1 shows a 5 × 4 Camera in a Lady's hand (this block being cut from a photograph). Fig. 2 shows the Camera with the front lid open, showing the shutter and lens. Fig. 3 shows the back lid of Camera open, book of plate holders and leather case.

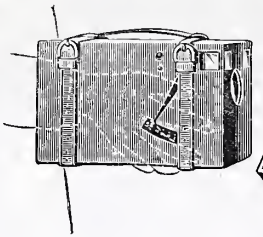


Fig. 1.



Fig. 2.

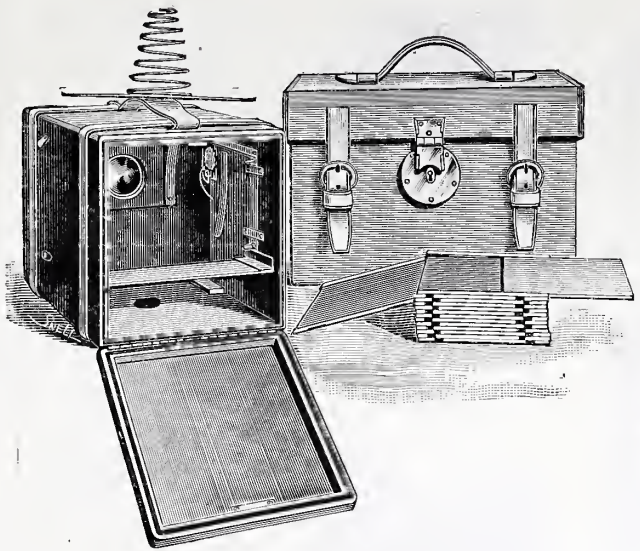


Fig. 3.

Three kinds of books are made, one for 12 ordinary plates, one for 20 cyclist plates, and one for 30 films; each book occupies the same space.

The Camera is supplied with one book for 12 plates, unless otherwise ordered, but either kind can be supplied at the rate of 1/6 per sheath extra.

The Camera may be turned on its side for upright pictures.

Price of Camera, with one book to carry 12 plates and fitted with Taylor, Taylor & Hobson's D lens, with Iris diaphragm—¼-Plate, **£10 12s.**; 5 × 4in. Plate, **£11 13s.**; 9 × 12in. Cent., **£11 13s.**; Solid Leather Case for ditto, **£1 1s.**; New Sunk Crystal Finders, **10s. 6d.** the pair; the New Focussing Arrangement, which is worked from the outside, **10s. 6d** Screw and Fitting for Stand, **2s. 6d.**

C. LAWRANCE,

PHOTOGRAPHIC APPARATUS MANUFACTURER,

141, FULHAM PALACE ROAD,

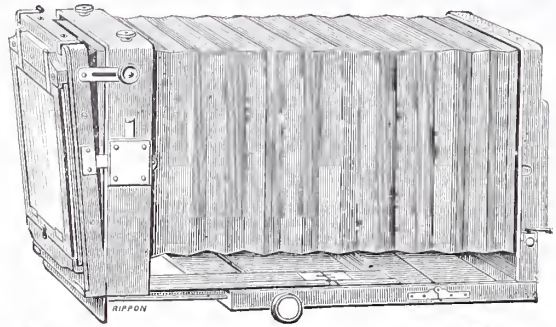
HAMMERSMITH, LONDON, W.

Sole Inventor and Manufacturer of **The CLIFFORD Hand Camera** (Patent), by which 12 plates can be exposed in less than as many seconds.

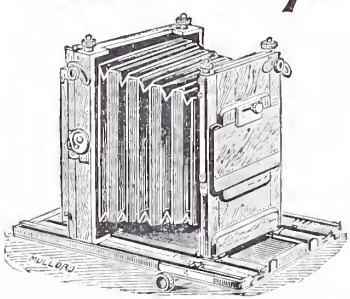
SANDS, HUNTER & Co.

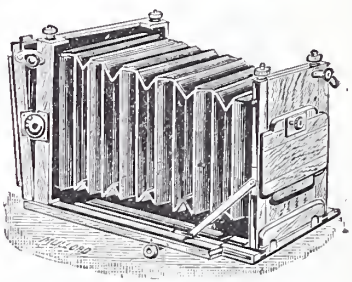
20, CRANBOURN ST., LONDON, W.C.

The Exhibition Camera



The Imperial Camera.





For Prices send for New Illustrated Catalogue, gratis and post free.

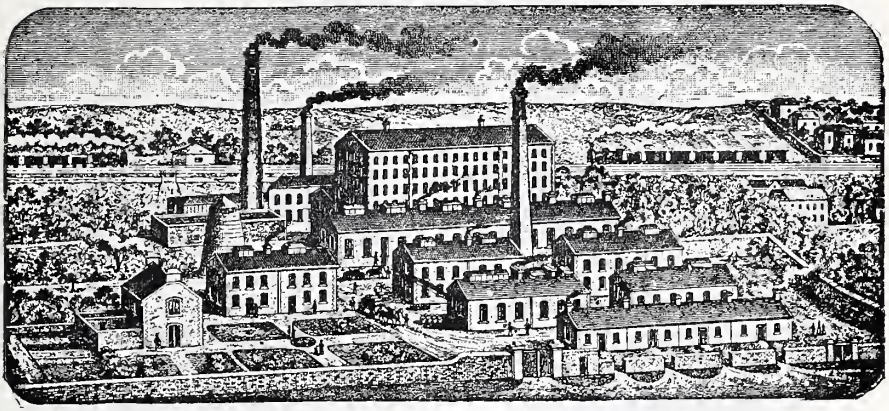
Good Second-hand Apparatus bought, sold, and exchanged. A large stock always in hand.

LIST ON APPLICATION.

All other makers' Lenses, Cameras, &c., supplied at usual prices and discounts.

AMATEURS' APPARATUS SOLD ON COMMISSION.

20, CRANBOURN ST., LEICESTER SQUARE, LONDON, W.C.



HARRINGTON BROS.,

SHANDON CHEMICAL WORKS, CORK,

SPECIAL MANUFACTURERS OF ALL KINDS OF

PHOTOGRAPHIC CHEMICALS,

OF GUARANTEED PURITY.

(In Bulk or in neatly Capped Bottles, ready for retailing, with Trader's own Labels if desired.)

SPECIALITIES.

ENAMELLING COLLODION (As used by the Principal Photographers).
PLATINUM CHLORIDE. POTASSIUM CHLORO-PLATINITE.
SULPHO-CYANIDES OF AMMONIA AND POTASH. SODA SULPHITE.
And all SALTS OF CADMIUM, IRON, POTASH, SODA, URANIUM, &c., &c.

TESTIMONIALS.

From Monsieur LAFAYETTE, the celebrated Dublin Photographer (Photographer to the Queen by Royal Warrant).

30, Westmoreland Street, Dublin, July 3rd, 1889.

DEAR SIRS,—I have much pleasure in bearing testimony to the superlative excellence of **Harrington's Enamelling Collodion,** which has been in exclusive use in my studio for a considerable time, and has given the utmost satisfaction. It can be relied upon for uniformity of quality, and gives an exceptionally hard, brilliant and textureless surface—in fact, leaving nothing to be desired. With it the largest pictures can be finished with the same facility as Cartes and Cabinets, and all my **Paris Exhibition Photographs, measuring 36 by 18,** are enamelled with it. Yours truly, (Signed) J. LAFAYETTE.

Queen's College, Cork, October, 1890.

It gives me great pleasure to bear testimony to the excellence of the Chemicals manufactured by Messrs. Harrington For many years I have been supplied by them with Chemicals, and everything got from them **invariably** gave me **perfect satisfaction.**

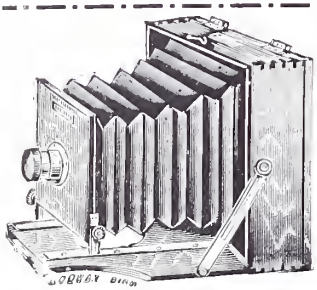
Signed) MAXWELL SIMPSON, LL.D., D.Sc., M.D., F.R.S., F.R.U.I.,
Professor of Chemistry, Queen's College, Cork.

TELEGRAMS: "MAGNESIA, CORK." THE TRADE ONLY SUPPLIED

The only Silver Medal awarded for Photographic Apparatus by the Gloucestershire Photographic Society.

Marlows, Limited,

BIRMINGHAM.



THE "SPECIAL."

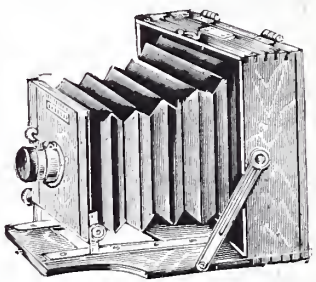
Reversible holder, folding tail board, complete with lens. One double slide and folding stand.

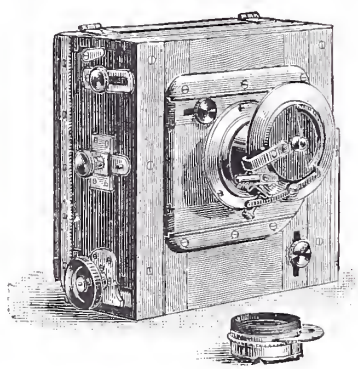
	PRICES.		
	¼-plate	½-plate	Full plate
	21/-	42/-	63/-
Extra Slides	5/6	10/-	18/-

THE "MODEL."

Reversible holder, rising and sliding front, swing back, folding tail board, complete with rack lens. One double slide and folding stand.

PRICES.		
¼-plate	½-plate	Full plate
31/6	63/-	90/-
6/-	10/6	18/-





THE "INSTANTO."

Reversible holder, rack and pinion movement, double swing back, rising and sliding front, leather bellows, lens with rotating stops and instantaneous shutter, one double slide and folding stand.

	PRICES.		
	¼-plate	½-plate.	Full plate
	45/-	85/-	130/-
	76/-	12/6	20/-

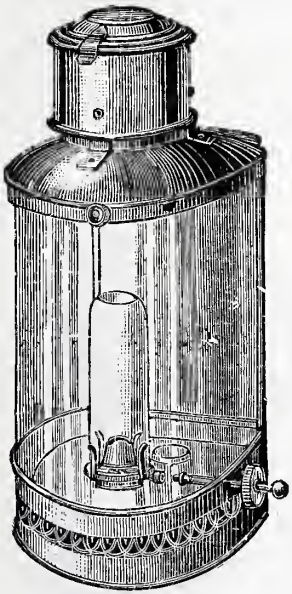
MARLOW'S "EXCELSIOR."

Long extension; reversible holder; rack and pinion movement; swing back; rising front; leather bellows; lens with Iris diaphragms, and patent shutter with spring to regulate speed; one double slide; and folding stand.

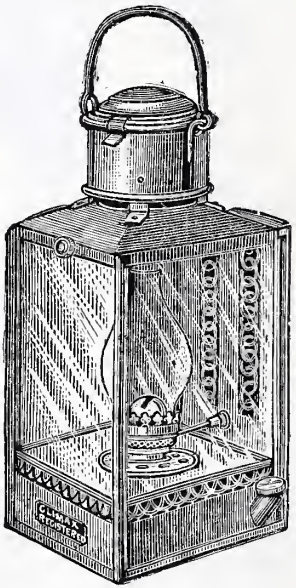
PRICES:

¼-plate, **50/-** ½-plate, **90/-** Full plate, **140/-**

EXTRA SLIDES.—¼-plate, 7/6; ½-plate, 12/-; full plate, 20/-



The "SHADOWLESS" (Patent).
Price **10/6.**



The "CLIMAX" (Registered).
Price **8/-**

The "TOURIST" Folding Lamp with Wax Light. Price 2/6.
VERY COMPACT LIGHT.

Non-actinic Glass for Dark Rooms,

AND ALL KINDS OF GLASS FOR

PHOTOGRAPHIC & MAGIC LANTERN PURPOSES

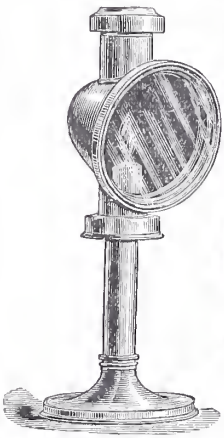
PRICES ON APPLICATION.

28 & 30, CONSTITUTION HILL, BIRMINGHAM.

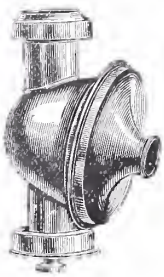
THE "HOLIDAY"

CANDLE LAMP.

(PATENT.



Open for Use.



Packed for Travelling.

The only Lamp that combines Portability, Powerful and Safe Light, Durability, Cleanliness, Suitability for Changing Plates when Touring, or for Ordinary Developing and Reading.

PRICE 10/6.

The 'PERFECTION'

Amateur Photographer's Dark Room

CANDLE LAMP.

(PATENT.)

It gives much more light than usual, with much less heat.

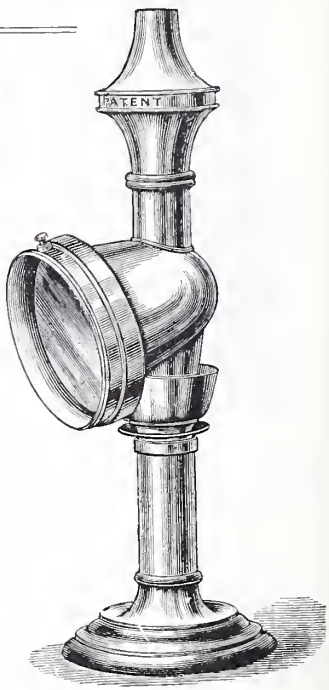
The Light is quite safe for use with the most sensitive films.

By means of the Parabolic Reflector the lamp can easily be placed so that the light falls only on the work, and the eyes are not fatigued.

White light is available in an instant whenever required.

The candles, which are very hard and cleanly, can be easily and quickly replaced, and the annoyance of lamp trimming is avoided.

The lamp can be used at varying heights, the candle being held in an extending tube.



PRICE ONE GUINEA.

OF ALL PHOTOGRAPHIC DEALERS.

If cannot obtain, write to the Patentees & Manufacturers,

BENHAM & FROUD, Limited,

CHANDOS STREET, LONDON, W.C.

(WHOLESALE ONLY.)

CARBUTT'S ORTHOCHROMATIC "CELLULOID" FILMS.

CUT SIZES

TESTED UNDER ALL CONDITIONS OF CLIMATE. THE PERFECTION OF FILM PHOTOGRAPHY.

Requiring exactly the same treatment as Dry Plates.

NO Halation. NO Weight. NO Risk of Breakage. Coated on Specially Selected Transparent Celluloid.

PRICE LIST OF CARBUTT'S FLEXIBLE NEGATIVE FILMS

B' Landscape, Sen. 16. Orthochromatic, Sen. 23. 'Special,' Sen. 23 to 25. 'Eclipse,' Sen. 27.

ENGLISH MEASURE.

Inches.		American Money.	English Money.
3¼ x 4¼	per doz.	$ 55	2/3
4 x 5	,,	80	3/4
4½ x 6½	,,	1 10	4/7
4¾ x 6½	,,	1 20	5/-
5 x 7	,,	1 40	5/10
5 x 7½	,,	1 50	/3
5 x 8	,,	1 55	6/6
6½ x 8½	,,	2 10	8/9
8 x 10	,,	3 00	12/6
10 x 12	,,	4 75	19/8
11¾ x 14	,,	6 25	26/-

For intermediate sizes, take price of next size larger.

FRENCH MEASURE.

Centimetres.		American Money.	French Money.
9 x 12	Per doz.	$ 80	fr. 4
13 x 18	,,	1 40	7
12 x 16½	,,	1 20	6
12 x 20	,,	1 50	7 50
18 x 24	,,	2 85	14 25
21 x 27	,,	3 10	15 50
24 x 30	,,	4 30	21 50
27 x 33	,,	4 95	24 75
For the Moessard Panoramic Camera.			
8 x 28	Per doz.	$1 30	fr. 6 50
12 x 42	,,	3 20	16
16 x 50	,,	4 90	24 50
20 x 70	,,	8 50	42 50
21 x 84	,,	12 15	60 75
28 x 98	,,	17 60	88
32 x112	,,	23 00	115

FLORENCE, ITALY, March 29th, 1892.

MR. JOHN CARBUTT.

Dear Sir,—I took 100 of my film Negatives to-day (exposed under all sorts of conditions, rain and shine, time and instantaneous, and developed on board steamer, in sleeping car and hotels) to Mr. Shemhoche, the leading Photographer here and in Rome, to be printed. I take for granted the films are working finely from the fact that while looking the negatives over he kept exclaiming "Magnificent, magnificent," and called some of his operators in to examine.

This evening he came to the hotel and asked many questions about them, all of which I answered as well as I could, and promised to write you and request you to correspond with him, and give him the address of your European Agents, also give him your prices.—Yours, &c.,

D. F. FAIRCHILD.

NEW YORK, February 2nd, 1892.

MR. JOHN CARBUTT,

Dear Sir,—It will be a satisfaction to you to know that I have succeeded with the Ortho Plates No. 27 you sent me, and have some very fine negatives, although most of the exposures were made under very trying conditions.

One exposure dead against the sun and heavy cloud banks, ten minutes after the sun had risen from the ocean, has given me a "Moonlight" ocean picture, marvellous in its beauty. Projected by the lantern on the screen, it is as realistic as any picture I ever saw.

Yours truly,

T. S. SIMMONS.

Agents for Great Britain: THE LONDON STEREO & PHOTO Co., 106 & 108, Regent St.

Manufactured by JOHN CARBUTT

(Pioneer Manufacturer of Gelatino-Bromide & Orthochromatic Plates in America).

KEYSTONE DRY-PLATE WORKS.

Wayne Junction, PHILADELPHIA, U.S.A.

We do not profess to sell everything, but make a Speciality of

Photographic Glass,

which we supply Wholesale to Shippers and other large buyers. There is scarcely a Wholesale House in the United Kingdom or the Colonies whose name is not on our books, and with whom we are not in constant communication. This is the best and only real proof of the quality and cheapness of our articles. If buyers are in want of anything special in the Photographic Glass line, they invariably

Try DE SAULLES.

The following is the index to the 1892 edition of our Catalogue. A cursory glance will show its variety and completeness:—

	PAGE
Beaded Edge Glass	20
Bevelled Sheet Glass	6 and 20
Bevelled Plate	15 and 20
Cardboard Boxes for Opalines	6
Chocolate Edge Glass	20
Cloth Opaline Backs	6
Convex Opal Glasses, Plain and Fancy	11
Cover Glasses for Lantern Slides	13
Cover Glasses for Microscopical Slides	16
Crystalline Glasses	19
Cutting Shapes (otherwise known as Cutting Guides)	8
Dark Room Lamps	18
Developing Dishes	17
Focussing Screen Glass	14
Gilt Edge Glass	6 and 20
Graduated Measures	17
Green Glass for Silver Printing	14
Ground Glass for Focussing Screens	14
Ivy Leaf Metal Stands	19
Lamps for Dark Rooms	18
Lantern Slide Glass	13
Leatherette Backs for Opalines	6
Matt Surface Opal	9, 10 and 1
Measures	17
Medallion View Materials	7
Metal Stands	19
Microscopical Glass	16
Mirrors	15
Opal	9, 10 and 11
Opaline Materi	6
Photo Frames	20
Positive Glass	13
Printing Frames	18
Silvered Edge Glass	6 and 20
Slides for Microscopical Work	16
Skywashed Opal	11
Tinted Opal	11
Vignetting Glasses	11

SOLE ADDRESS—

S. & G. De Saulles & Co.,

52 & 54, SPENCER STREET,

BIRMINGHAM.

Telegrams to—"DESAULLES, BIRMINGHAM."

JAMES D. GRIFFIN,

FLOODGATE STREET, BIRMINGHAM,

MANUFACTURER OF

PHOTOGRAPHIC & MICROSCOPIC GLASS



PHOTOGRAPHIC GLASS.

OPALINES, BACKS & BOXES.

VIGNETTING GLASSES.

PLATE GLASS CUTTING [SHAPES.

CAMERA GLASS.

GLASS FOR LANTERN SLIDES.

COLOURED GLASS.

RUBY LAMPS.

MICROSCOPICAL THIN GLASSES,
IN SQUARES AND CIRCLES.

CROWN SLIDES, TROUGHS, &c.



PHOTOGRAPHIC GLASS. MICROSCOPIC GLASS.

Trade Work.

Perfect Results. Lowest Prices. Promptitude.

BROMIDE ENLARGEMENTS.

Size of Enlargement.	Unmounted Enlargement on Paper.	Enlargement on Opal.	Enlargement on Paper—Rough, Mounted&Spotted	Enlargement on Best India Tint Mount.
6½ x 4¾	1/-	...	1/2	1/7
8½ x 6½	1 6	3/-	1/10½	2/3
10 x 8	1 9	3/7	2/1½	2/6
12 x 10	1/9	3/9	2/1½	2/6
15 x 12	2 3	5/7	2/10	3/3
18 x 15	2 8	...	3/5	4/2
23 x 17	3/9	...	4/6	5/7
24 x 18	5 6	...	6/6	7/9
24 x 20	5 6	...	6/6	7/9

We prefer making our own Negative when Enlargements are required from Prints. The charge for Copying is 1/-

BROMIDE CONTACT PRINTING.

Equal to Platinotype for softness and artistic effect.

Size of Print.	Prints Unmounted.		On Photographer's Mounts, and Spotted.		Prints Mounted on India Tint Mounts.	
	per doz.	per ½-doz.	per doz.	per ½-doz.	1st Quality per doz.	2nd Quality per doz.
C. de-V. & 4¼ x 3¼	1/9	1/-	2 3	1/3	4/-	3/6
Cabinet	3/3	2/-	3/11	2/4	6/-	5/6
6½ x 4¾	3/3	2/-	3/11	2/4	6/9	5/9
8 x 5	4 9	2/9	5/6	3 2	9/6	7/10
8½ x 6½	6/-	3/6	6/10	3/11	11/10	9/9
10 x 8	7/6	4/3	8/6	4/9	15/-	12/6
12 x 10	11/-	6/-	12/6	6 9	22/6	17/3
15 x 12	16 6	9/-	18 6	10/-	34/-	24/6

State if Rough or Smooth Paper to be used, and if Prints are to be Solid or Vignetted.

PLATINOTYPE PRINTING.

Size of Print.	Single Copy.	Per ½-doz.	Per Doz.	On Tea Green Mounts. Extra, per doz.	On Best Quality India Tint Mounts. Extra, per doz.	On Photographer's Own Mounts. Extra, per doz.
4¼ x 3¼	5d.	1/3	2/-	1/3	2/3	6d.
6½ x 4¾	7d.	2/2	4/-	1/9	3/-	8d.
8 x 5	8d.	3/-	5/6	3/-	4/8	9d.
8½ x 6½	1/-	3/6	6/-	3/8	5/-	1/3
10 x 8	1/6	4/9	8/9	5/-	8/-	1/6
12 x 10	2/2	7/3	12 6	9/-	9/-	2/-
15 x 12	3/-	10/-	20/-	11/6	12/9	2/6

Less than half-dozen Copies from same Negative are charged at Single Copy rate. Above prices include Vignetting.

ARTISTIC RE-TOUCHING.

Executed with despatch, in very best class style.

C. de V. ¾ fig. ... 3d. | Cabinet, ¾ fig. ... 6d
C. de V. Vignette ... 6d. | Cabinet Vignette 1/-

Groups and larger heads at special quotations.

ENAMELLING IN BEST STYLE.

Raised or Flat, exclusive of Mounts, at per dozen.

C. de V. ... ... 1/- | 8½ x 6½, flat only 5/6
4¼ x 3¼ ... ... 1/3 | 10 x 8 ,, ... 7/6
6½ x 4¾ ... ... 2/- | 12 x 10 ,, ... 11/-

Singly, 2d., 2d., 3d., 8d., 1/-, 1/6 each respectively.

Please send untrimmed prints.

SPECIAL NOTICE.

Amateur Photographers are requested to send for Special PRICE LIST of all work undertaken for them.

Photographic Dealers are requested to send their Trade Cards for Special DISCOUNT LIST.

Terms—Strictly Cash with order, including return carriage or postage on all orders under ten shillings.

ADDRESS—

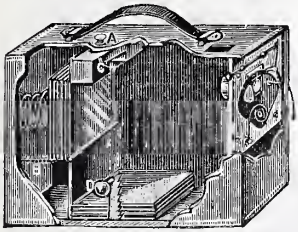
JOHN A. HICKS, GENERAL TRADE PHOTOGRAPHIC PRINTING AND ENLARGING WORKS,

New Cross, LONDON, S.E.

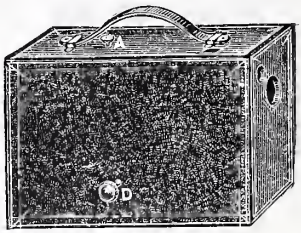
"CYTOX" MAGAZINE HAND CAMERA

Carries any number of ¼-plates, from 1 to 12, which are changed by simply pressing a button. Complete with Lens, Shutter and View Finder. Cannot possibly get out of order.

Price, Ebonised and polished Mahogany, **£3 : 3 : 0**
,, Leather covered ... ... **3 : 10 : 6**



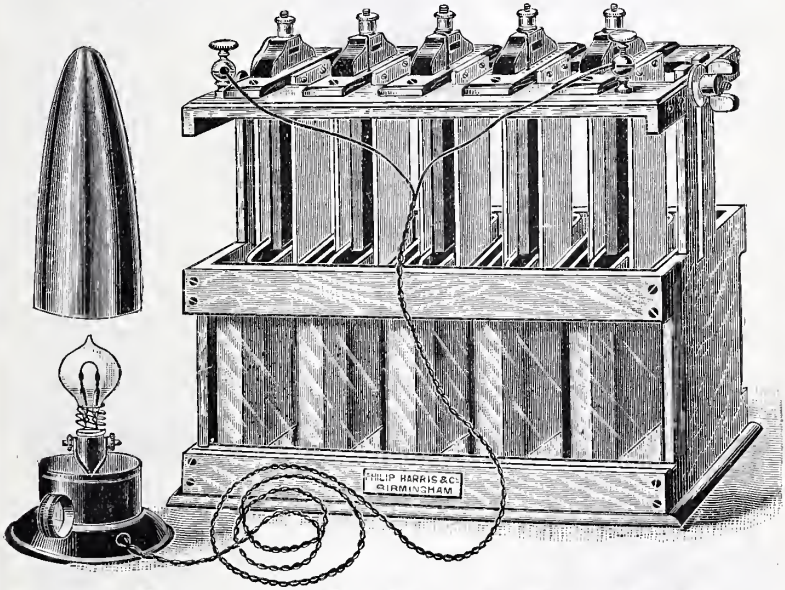
Size, 9in. × 5½in. × 6¾in.
Weight, 3¼lbs.



"CYTOX" ELECTRIC LIGHT FOR DARK ROOM

Consists of set of five Cells, complete with arrangement for raising and lowering the elements. Complete with Lamp (ruby chimney), etc., as illustration,

£2 : 5 : 0 Battery alone, **£1 : 19 : 0**



PHILIP HARRIS & CO., Ld.,

Manufacturers of Photographic Apparatus, Chemicals, etc.,

144 & 146, EDMUND STREET, BIRMINGHAM.

BROMIDE ENLARGEMENTS.

CARBON ENLARGEMENTS.

Platinotype Printing.

Gelatino-chloride Printing.

LANTERN SLIDES.

Spools of Film Developed

BY

COMPETENT MEN.

THOMAS ILLINGWORTH & CO.

38, Sherriff Road,

West Hampstead, LONDON, N.W.

PRICE LISTS FREE.

TO DEALERS ONLY.

LEVI THE FIRST

What's the use of a Camera if you haven't a Case for it?

Every man can't carry his Camera in his watch-pocket; and if he does, what'll he do with his watch?

S. J. LEVI & CO.,

17, FARRINGDON ROAD, LONDON, E.C.,

MANUFACTURE ON THE PREMISES

Every kind, sort, size, and description of Cameras, Stands, and Camera Cases.

OUR SOLID LEATHER GOODS ARE THE FINEST MADE.

WRITE FOR QUOTATIONS.

All descriptions of Photo Apparatus kept in Stock.

SPECIAL LINES IN R.R. LENSES.

UNDERSTAND!!

THE TRADE ONLY SUPPLIED!!

NO EARTHLY USE ANY BUT BONA FIDE DEALERS APPLYING.

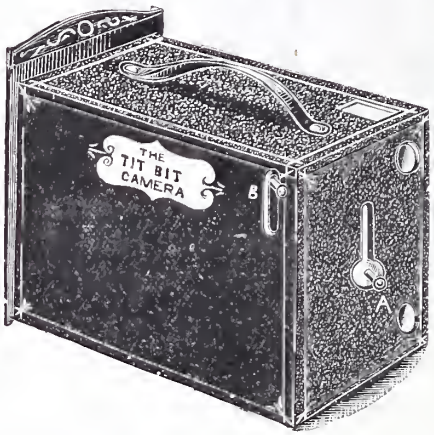
Tylar's Metal Cameras

"PHOTOGRAPHY IN A NUTSHELL." THE Photographic Enquire Within. 1/-, post free 1/3.

THIS IS NOT A TOY, BUT WILL DO GENUINE WORK.

W. TYLAR'S

'TIT-BIT' HAND CAMERA.



FROM 10/6 EACH.

Without doubt the neatest and best fixed focus Hand Camera yet offered, and will sell by hundreds.

ADVANTAGES.

1st.—Strength, being made entirely of metal.
2nd.—Interchangeable covers of cloth or leather, so that when one is worn out it can be replaced.
3rd.—Very compact. Measurement, $3\frac{3}{4}$in. × $4\frac{1}{4}$in. × $5\frac{1}{4}$in. Weight with slide, 24oz. only.
4th.—Extra Slides can be added at will, as the back is machine made and adapted for

TYLAR'S NEW SINGLE METAL DARK SLIDES.

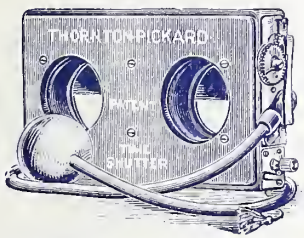
5th.—No loose parts, shutter set by moving up the front knob. Released by pressing down knob at the side of camera.
6th.—Can be had in various qualities of coverings—Imitation Crocodile, Lizard Skin, Morocco, or Cloth.

PRICES.

Cloth covered, ¼-plate, 1 slide	10/6
Leather covered, ¼-plate, 1 slide	12/6
Cloth covered, with double finders	12/6
Leather covered, with double finders	15/-
Extra Dark Slides, 6 in a Canvas Sling Case..	10/6
Do, do. 12 do. do..	20/-

W. TYLAR,

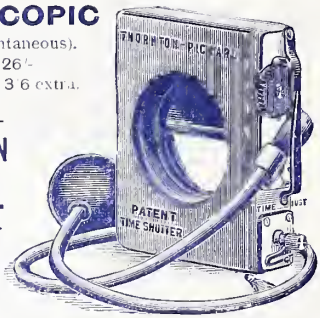
57, High Street, Aston, Birmingham.



STEREOSCOPIC

(Time and Instantaneous).
Price from 26/-
Speed Indicator, 3/6 extra.

NO VIBRATION WITH THESE **SHUTTERS.**



FOREGROUND (Time and Instantaneous).
Price from 23/6. Speed Indicator, 3/6 extra.

EXTRA RAPID (Time and Instantaneous).
Prices same as Foreground.

SAFETY BLIND (For Detective Cameras).
Fitted to Standard Time Shutter, 5/- extra.

TIME AND INSTANTANEOUS

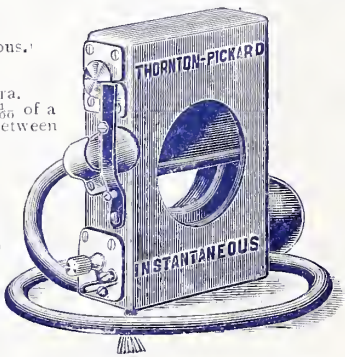
(Standard Pattern).
Price from 18/6. Speed Indicator, 3/6 extra. See Pages 409 and 410.

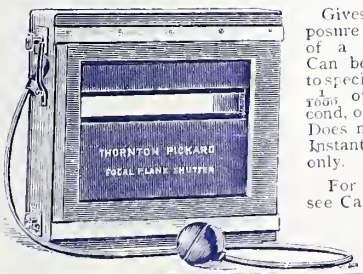
THE THORNTON-PICKARD PATENT SHUTTERS



SPECIAL.

(High Speed. Instantaneous.)
Price from 23/6.
Speed Indicator, 3/6 extra.
Speed of smallest size, $\frac{1}{250}$ of a second, or $\frac{1}{400}$ if mounted between the combinations of the lens





FOCAL PLANE.

Gives an exposure of $\frac{1}{500}$ of a second. Can be made to special order $\frac{1}{1000}$ of a second, or faster. Does not give Instantaneous only.

For Prices, see Catalogue.

INSTANTANEOUS.

(Like the Standard Pattern Time, but without the Time arrangement.)
Price from 11/6.
Speed Indicator, 3/6 extra.

THE

THORNTON-PICKARD

PATENT.

This is a compact Roller-blind Shutter, which fits in front of or behind the lens. It dispenses entirely with the lens cap, and is a most perfect substitute. By its use any exposure may be obtained, from the smallest fraction of a second up to minutes or hours,

WITHOUT VIBRATION.

The numberless unsolicited Testimonials which we are constantly receiving prove to a certainty that in practice there is

ABSOLUTELY NO VIBRATION.



The working is so simple that anyone can use it. The Shutter is wound up by pulling the cord, and is released for Exposure by squeezing the pneumatic ball. The lever is moved to either "Time" or "Inst.," as required.

The speed is adjusted by the knob S. The new Speed Indicator (shown below) is a great acquisition, it shows on a dial at what speed the Shutter is set.

The Thornton-Pickard Shutters work in any position, and do not "go off" accidentally. The moving parts are very light, but strong and durable.

TIME SHUTTER

(Standard Pattern.) For TIME & INSTANTANEOUS EXPOSURES.

PRICES—FOR LENS HAVING HOOD UP TO

Inches.....	1½	2	2¼	2½	2¾	3	3½	4	4½	5
To give "Time" and "Inst." Exposures.	18 6	20 6	22 6	23 6	25 -	27 6	32 6	37 6	42 6	47 6

Speed Indicator, **3 6** extra.

WHEN ORDERING

Please send a narrow strip of paper and length to exactly round the Lens Hood or Tube; also mention kind of lens. This enables us to make the Shutter as small as possible. Insist upon having the Shutter made to fit upon the Lens.



This Shutter works equally well whether fitted to the Lens Hood or the Lens Body.

FOR HAND CAMERAS

The Shutter can be fitted with a Cord Release (instead of Pneumatic) at **1 - less** than above prices. It can also be had fitted with our new **SAFETY BLIND,** which automatically covers the opening whilst the Shutter is being set for the next exposure, and then flies back out of the way (see pages 409 and 410). **PRICE 5 - EXTRA.**

THE THORNTON-PICKARD SHUTTERS.

THERE are doubtless few if any, practical photographers at the present day who would question the superiority of the Roller Blind Shutter over every other type; and no doubt all who have carefully studied the theory, construction and practical use of various kinds of shutters are agreed that there is no other form so satisfactory and reliable. It is now some years since we became convinced of this fact, since which we have made it our business to improve and perfect this particular form of shutter, and to make it the SHUTTER OF THE DAY. How far we have succeeded may be judged from the fact that The Thornton-Pickard Shutter has now

THE LARGEST SALE IN THE WORLD.

The introduction of our Patent "Time" Shutter has made it possible to give *any* exposure, from fractions of a second up to minutes or hours, without vibration, and therefore to dispense with the use of the lens cap entirely. This shutter is used for *all kinds of work* both by professional and amateur photographers.

For the information of those who may not have studied the matter we beg to offer the following remarks upon the

REQUIREMENTS OF A PERFECT SHUTTER:

It should be simple in construction and not liable to get out of order; it should be well made and carefully fitted; it should work without vibration, or the picture will be blurred and the lens will eventually suffer by the constant jar; there should be no sudden reversal of the moving parts, they should be light and well-balanced, and travel in one direction only, otherwise vibration will be unavoidable; the shutter should work equally well in front, behind, or between the lenses, and upside down, sideways, or in any other position; it should be safe and not liable to go off accidentally; it should give even illumination all over the picture; it should open instantly, remain completely open for the greater part of the exposure, and then close instantly; the pneumatic release should work with *one* squeeze of the pneumatic ball, so that short exposures, such, for instance, as 1-4th, 1-6th, or 1-10th of a second (which would be too quick to get with a lens cap, and too slow to get with an instantaneous shutter), may be obtained by squeezing the ball to open the shutter and letting it go quickly to close; these short exposures cannot be got when two squeezes are necessary.

Experts—both in theory and practice—are agreed that the above points are necessary in a perfect shutter for all-round work. *The Thornton-Pickard "Time" Shutter possesses every one of them.*

Our standard pattern is, without doubt, the simplest and the best for general work; but we have modifications of it for special purposes, such as the Foreground, Extra-rapid, Stereoscopic, Shutter Behind Lens (Time and Instantaneous), also the Instantaneous, Special, and Focal Plane (for Instantaneous only).

READ WHAT OTHERS SAY.

What the Press says.

"Its action is really admirable, the mechanism being both ingenious and simple. It is well made, and the various actions are effected without any jar."—J. TRAILL TAYLOR, Editor *British Journal of Photography.*

"The Thornton-Pickard Time Shutter exactly fulfils your requirements."—*Photography.*

"You cannot do better than obtain the Thornton-Pickard Shutter for the special purpose you require it."—*Photography.*

"The Thornton-Pickard Time Shutter is a very good instrument. We have used one for the past two seasons, with considerable pleasure and success."—*Photography* (Answers to Correspondents).

"It is certainly capable of answering every possible requirement. This last improved form will make the Shutter even more popular than it is."—*Amateur Photographer.*

What the Dealers say.

"I am glad to say that we are selling your Shutter very well. They always give satisfaction, and are never returned."—W. & S.

"I beg to mention that your Shutters are selling as well as ever."—W. W.

"The Shutters you supplied give great satisfaction to the customers, and are approved by all."—E. H.

What Users say.

"The Time Shutter seems to be as near perfection as possible, and for variety of speeds combined with the utmost simplicity in working it could not be excelled."—R. B.

"I have tried the Shutter at full speed on a train this afternoon, with satisfactory results."—E. W. B.

"My Shutter works excellently. You may rest assured that I shall take every opportunity of recommending your Shutter, believing, as I do, that it is the best practical Shutter in the market. It has no complicated mechanism, like too many of the shutters at present in use. Several of my friends have discarded much more expensive and complicated shutters in favour of yours."—J. B. Y.

"I consider it simply invaluable, and certainly the most perfect in principle that is in the market, and I am very much pleased with its performance."—J. H. J.

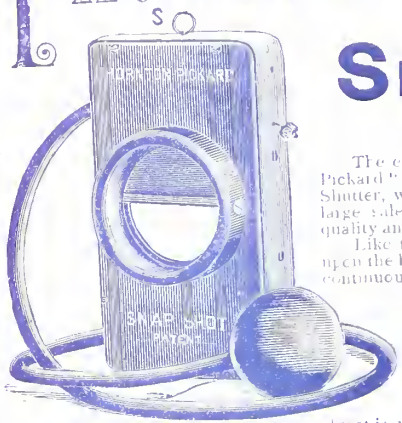
"The 'Time' Shutter for gallery use gives great satisfaction to my customer, who tells me that by avoiding vibration, as with cap, he can now get sharper pictures."—J. W.

"This Shutter is one of the most perfect, if not *the* most perfect, at present in the market. The speed is easily adjustable. There is no vibration during exposure, and no possibility of the plate being fogged while waiting to make the exposure."—H. W. B., in the *British Journal of Photography.*

THE THORNTON-PICKARD MANUFACTURING COMPANY,
St. Mary's Street, Deansgate, MANCHESTER.

THE

THORNTON-PICKARD



SNAP SHOT SHUTTER.

The enormous success of our well-known Thornton-Pickard "Time" Shutter has led us to introduce this new Shutter, which we confidently believe will command a large sale, on account of its moderate price, excellent quality and suitability for its purpose.

Like the Thornton Pickard Time Shutter, it is made upon the Blind principle, and, in like manner, its action is continuous and is, therefore, free from vibration. It winds up by pulling a cord, and a glance shows whether it is set or not. The motive power is obtained from two spiral steel springs, of the best form, which will not break or lose their elasticity like rubber bands. It works in any position.

As its name implies, this is an Instantaneous Shutter, and it works at high and slow speeds. The slowest speed is suitable for ordinary work, and should always be used when the object is not moving quickly or is some distance off.

PRICES OF SNAP SHOT SHUTTERS.

To fit Lens Hood or Tube up to	1¼in.	2in.	2½in.
Price with Button Release	6 6	8 6	10 6
Price, with Pneumatic Release and Button Release	8 -	10 -	12 -

We recommend the Pneumatic Release, unless the shutter is to be used in a Hand Camera.

SAFETY SNAP SHOT SHUTTER.

We have pleasure in introducing this new Shutter, as it fills a want which has been keenly felt by all users and makers of Hand Cameras for years past. It is a Blind Shutter, that automatically covers the lens whilst the Shutter is being set for the next exposure, without admitting light during the act of setting. Its small dimensions allow it to be fitted to almost every description of Hand Camera and for such it has no rival.



The Safety Snap Shot Shutter is similar to the one above described, but is fitted with our new Safety Blind, which is of the simplest construction. When pulling the tassel to set the Shutter the Safety Blinds wind up at the same time and covers the aperture until the Shutter is set, after which it springs back again and leaves the Shutter ready for making the exposure. The advantage of this is obvious, for the plates in a Hand Camera (whether it be a magazine or any other form) need no further cover to protect them from light passing through the lens; and when the Safety Blind is used with an ordinary Camera on a Stand, the Shutter can be set after the slide is drawn, so that there is no need to push in the slide again if you forget to set the Shutter first.

The action is automatic and sure, so that the plate can only be exposed when the button is pressed or the ball squeezed. This particular method of release is the best, as it does not shake the Camera when being used. It consists of a small wooden bead or button attached to the release cord where it comes through close to the side of the Shutter (see illustration). The slightest *downward* pressure on the button is sufficient to release the Shutter. The cord is left long so that it can be brought to the outside of the Hand Camera and fixed in any convenient position.

PRICES.

For Lens Hood or Tube, up to	1¼in.	2in.	2½in. diam
Price (with Button Release)	10 -	12 6	15 -
If fitted with Pneumatic Release in addition,	1 6 extra.		

The above Shutters are made of Mahogany, and finished black; but they can be French Polished instead for 2 6 extra, if required. *When Ordering, please send a narrow strip of paper that just meets round the lens hood or tube; also mention kind of lens and maker's name if possible. Insist upon having the Shutter made a perfect fit upon the lens.*

The THORNTON-PICKARD Patent

SAFETY BLIND fitted to 'TIME' SHUTTER

The new patent Safety Blind is also fitted to our Time and Instantaneous Shutter (Standard Pattern) at the prices mentioned below. The advantages of the Safety Blind, as mentioned above, are thereby combined with the great range of speed—from the smallest fraction of a second up to minutes or hours—characteristic of our "Time" Shutter. It works in precisely the same manner as above described

Prices of the Safety Blind fitted to "Time" Shutter, extra beyond the prices quoted on page 188.

Up to 2½in. size	5 -
,, 3½in. ,, ...	7 6
,, 5in. ,, ...	10 -

Please Note.—These prices apply to new Shutters only; the Safety Blind cannot be attached to Shutters previously purchased.

The THORNTON-PICKARD Patent

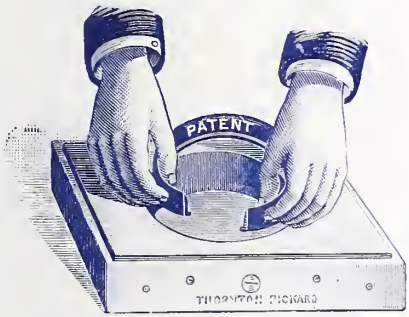
RUBBER MOULDING

For fitting Shutters to Lenses, and for Adapting One Shutter to Two or more Lenses; can be used with the THORNTON-PICKARD or other make of Shutter.

THE MOULDING

is made of the thicknesses shown.

PRICE 8d. per foot.





№ 1	2	3	4	5	6	7
1/16in.	3/32in.	1/8in.	5/32in.	7/32in.	3/16in.	1/4in.

FITTING.—It should be cut to the required length with a sharp knife or scissors, and sprung into the aperture with the rib or flange on the inside, as shown in the engraving.

ADJUSTMENT.—The screw in the side of the Shutter will give the exact adjustment by turning with a screw-driver. An accurate fit upon the lens hood is thus insured.

Any thickness may be rubbed down on the back with a piece of sand paper when too thick, or in case of emergency a piece of cardboard may be used as packing behind the Moulding when it is not thick enough.

ADAPTERS.

When it is desired to fit two or more Lenses to the same Shutter a second piece of Moulding may be used inside the first one, so as to form an Adapter which can be put in or taken out as required.

Price 8d. each.

In case a very large Shutter has to be adapted to a very small Lens, or where the difference between the two sizes is more than half an inch, a wooden Adapter lined with the Rubber Moulding is necessary; price **1/6** up to 2½in. diam., and **2/-** if larger.

EXTRA PNEUMATIC RELEASE for SHUTTERS.

ORDINARY PATTERN, as supplied with Shutters, consisting of ball with two feet of tubing and teat complete in one piece, price **1/6.**

SPECIAL SIZE for Self-portraiture with Groups, &c., consists of Large Ball, price **4 -,** and Long Tubing, **5d.** per foot. Please state length required.

THE THORNTON-PICKARD MANUFACTURING COMPANY,

St. Mary's, Deansgate, MANCHESTER.

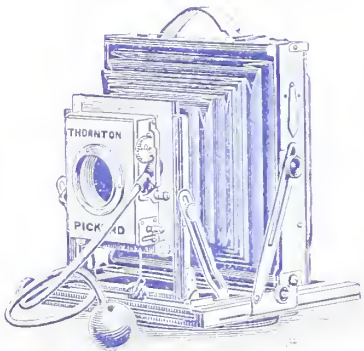
THE

THORNTON-PICKARD

NEW

'RUBY'

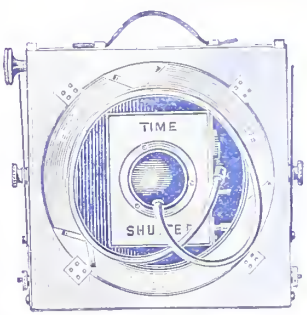
CAMERA.



LIGHT.
STRONG
RIGID.
COMPLETE.



SHUTTER ATTACHED TO THE CAMERA FRONT.



ALWAYS IN POSITION.

FOLDS UP WITH THE CAMERA.

THE

MOST CONVENIENT AND PORTABLE

Camera yet introduced. Gives satisfaction to all who see or use it.

NEW IMPROVEMENTS THIS SEASON.

THE THORNTON-PICKARD NEW "RUBY" CAMERA

Has novel features, of the greatest utility, not possessed by other Cameras; in addition to which it is remarkably light, rigid, strong, and moderate in price.

The **SHUTTER** is attached to the Camera front, and works behind the lens. It is fitted with a detachable panel, to which the lens flange may be attached, so that any number of lenses may be used with the same Shutter, and changed in a moment. The Shutter is always in position, ready for use.

A special form of **TURNTABLE** is fixed to the Camera, to which the legs may be quickly attached. This arrangement is infinitely superior to the old fashioned loose triangle, as there is no chance of leaving it behind, and so rendering the Camera useless when away from home. The centre of the Turntable is cut away, so that the LENS AND SHUTTER FOLD UP WITH THE CAMERA. There is no need to detach them each time it is folded. The Camera may be used for WIDE ANGLE (or short focus) LENSES without danger of the baseboard cutting off part of the picture. This is done by pushing the Camera Body or Back forward to the front of Camera and then clamping it in position by the screw at the side. The Camera is also suitable for LONG FOCUS LENSES, as it racks out to more than double the length of plate. The method of fixing the Front is specially simple and rigid.

A New Improvement

We have just added the Double Pinion, so that the Camera has now two Pinions which enable it to be racked from the shortest to the longest focus without any unscrewing or moving of the parts, and without removing the head from beneath the focussing cloth.

The Back can still be moved up to the Front, and clamped, for very wide angle lenses, but there is no need to do this with lenses of ordinary focus.



The **RUBY SLIDES** are of the best finished workmanship, and have hinged folding Shutters, which may be folded back under the focussing screen, so as not to catch the wind during exposure. They are fitted with Watson's Patent Snap (see engraving), which securely fastens the Shutter when pushed in. The slides are perfectly light-tight, and are therefore suitable for the most sensitive plate This is due to the careful workmanship, to the special form of velvet packing placed under the Shutter, and to the Snap being on the OUTSIDE instead of recessed into the Shutter. *(See engraving.)*

The Slides are Book Form, and hold two plates each, which are separated by a hinged division that cannot be misplaced or lost in the dark room.

The **TRIPOD STAND** is of very light construction, but is very strong and rigid when set up. It folds into three for convenience in carrying, and has handle and straps for that purpose, complete. The bottom joint is made to slide, for adjusting the height on uneven ground.

The **SHUTTER** (Thornton-Pickard "Time"), which is fitted to the Camera, allows any kind of exposure to be given, from the most rapid Instantaneous to the most prolonged (even such as would be given to an interior), without need of a lens cap. It can be fitted with additional panels for other lenses, just as a Camera front, and it can be removed bodily from the Camera in a moment if desired. The cap can, however, be used without removing the Shutter if desired.

There is EVERY NECESSARY MOVEMENT, including Swing Back, with Plumb Indicator, and also Horizontal or Side Swing; Swing Front, with independent Rising and Falling Motion of great range; and Reversing Back for vertical or horizontal pictures. The Camera is remarkably compact and light. The following are a few particulars:—

	Half plate.	Whole plate.
SIZE when folded, including all projections, without Turntable and Shutter	9 x 8¼ x 2½ ...	11 x 10½ x 2 in.
„ when folded, including all projections, including Turntable and Shutter	9 x 8¼ x 3¼ ...	11 x 10½ x 3½ in.
WEIGHT, without Turntable and Shutter	2¾lbs. ...	4¾lbs.
„ including „ „ „	3¼lbs. ...	5lbs.
LONGEST FOCUS, with Shutter	16 inches ...	19½ inches.

AN IMPORTANT FEATURE of the Ruby Camera is that it is self-contained. The Shutter, Lens, Turntable, Plumb Indicator, &c., are all attached to the Camera. There is nothing loose that may be left behind, and so cause the photographer annoyance.

THE "RUBY" CAMERA is the **SIMPLEST** and the **BEST** all-round Camera, and is suitable FOR ALL KINDS OF WORK, amongst which we may mention the following: Travelling and Touring; Architectural Work; Home Portraiture; Copying Photos, Engravings, &c.; Making Lantern Slides from Negatives of larger or smaller sizes, Enlarging or Reducing, &c.

PRICES.

	Half plate (6½ × 4¾).	Whole plate (8½ × 6½)
"Ruby" **CAMERA,** with three slides...	£6 17 6	£9 10 0
Three-fold "Ruby" **STAND**	1 0 0	1 0 0
TURNTABLE (to fit Ruby Stand)	0 10 0	0 12 6
Fitted with Time and Instantaneous **SHUTTER** attached to Camera Front, extra	1 0 6	1 3 6
SPEED INDICATOR, fitted to Shutter, extra	0 3 6	0 3 6

THE

THORNTON-PICKARD

MANUFACTURING COMPANY,

St. Mary's Street, Deansgate, MANCHESTER.



The THORNTON-PICKARD Patent
PLUMB INDICATOR.

For attaching to Camera. Cannot get Lost. No Skill required to Fix.

If the Swing Back (and consequently the sensitive plate) does not hang plumb when photographing Architectural subjects, the vertical lines of the building will not be parallel in the finished photograph, and the effect will be what is generally termed "drunken architecture"—everything will look askew.

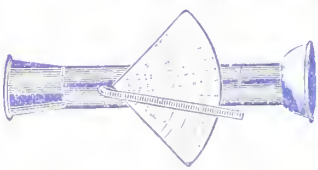
It is difficult to judge when the plate hangs plumb without either a spirit level or a PLUMB INDICATOR. The latter is by far the SIMPLEST and the BEST device. It is screwed permanently to the Swing Back of the Camera, and CANNOT GET LOST. It shows at a glance, with certainty, when the Back and Sensitive Plate are true and plumb. **PRICE ONE SHILLING EACH.**

IN BOX, COMPLETE WITH SCREWS READY FOR FIXING.

PICKARD'S EXPOSURE METER.

THE ORIGINAL AND THE BEST.

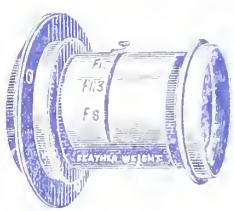
Measures the Intensity and not the Actinic rays of Light. Records without calculation.



This is a handy little instrument for ascertaining the correct exposure required for any given subject, and one which no amateur should be without. It does not get out of order, is very light, and of small bulk for packing in the camera or pocket. This instrument deals quickly with the light reflected direct from the object to be photographed. The exposure is ascertained in a few seconds, either before or after the camera is set up, by simply looking through the eyepiece and moving the pointer until the printing on the screen inside is only *just visible*. The figure near to the pointer, on the right hand side, is then the exposure required. The eyepiece is removable and may be used as a focussing glass to see when a picture is sharp on the ground glass of the camera.

PRICE 7 6 EACH.

"If I can tell exactly what exposure I am actually giving, I never make a mistake, as I work with a PICKARD'S EXPOSURE METER, which I find always gives the correct exposure."—T. E. H.



The Thornton-Pickard SPECIAL LENSES.

RAPID RECTILINEAR — The best all-round Lens. Suitable for very rapid Instantaneous Work, Architecture, Landscape, Portrait, Copying, etc. Largest aperture, F/8

AND

WIDE-ANGLE RECTILINEAR. — Suitable for Interiors, Architecture, Landscape, Copying and any views in confined situations. Largest aperture, F/11. Revolving diaphragms.

RAPID RECT.

To cover plates.....	5x4	6½x4¾	7x5	8½x6½	10x8	12x10	15x12
Focus in inches.. ..	5½in.	8¼in.	9¾in.	11in.	13¾in.	17¾in.	21in
With "Waterhouse" Diaphragm	£1 16	£2 5	£3 0	£3 10	£5 5	£6 5	£9 0
With Patent "Iris" Diaphragm..	2 11	3 0	4 0	4 10	6 5	7 10	10 10
With Aluminium Mount and Patent "Iris" Diaphragm	3 5	4 15	..	6 10			

The "Iris" Diaphragm fitted to these lenses has no clumsy projecting ring, but is contained entirely within the lens-tube, and has a small projecting knob to set by.

Aluminium mounting reduces the weight of a lens to less than half that of brass mounting.

WIDE ANGLE.

To cover	5x4	6½x4¾	8½x6½	12x10	15x12
Focus.....	5¾in.	5¾in.	7¾in.	9¾in.	10¾in
	£1 16	£2 5	£3 10	£4 7 6	£4 14 6

THE
THORNTON-PICKARD
MANUFACTURING COMPANY,

ST. MARY'S ST., DEANSGATE, MANCHESTER.

R. J. APPLETON & Co.,

MANUFACTURERS & MERCHANTS,

TRADE PRINTERS,

RETOUCHERS, ENLARGERS, AND

SENSITIZERS.

MANUFACTURERS OF

Magic Lanterns,
Cameras, and all kinds of Photographic and Optical Cabinet Work,
Dry Plates "Bradford,"
Mounts,
Sensitized Papers,
Photographic Backgrounds,
Lantern Slides,

WORK DONE FOR TRADE.

Developing,
Retouching,
Printing,
Mounting,
Enlarging,
Finishing and Painting
Etc., etc.

FACTORS IN

All makes of Lenses, Accessories, Mounts, Backgrounds, Burnishers, Plates, Papers, Lantern Slides, Gas Bottles, etc.; in fact, anything and everything required in the Photographic and Optical Trade.

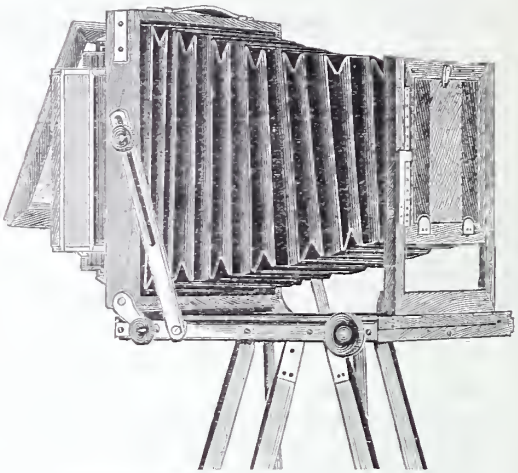
ESTIMATES FREE. INQUIRIES INVITED.

58, MANNINGHAM LANE, & 11, LEEDS RD., BRADFORD.

Telegrams: "Optical," Bradford.
Telephone, 1559 & 1559A.

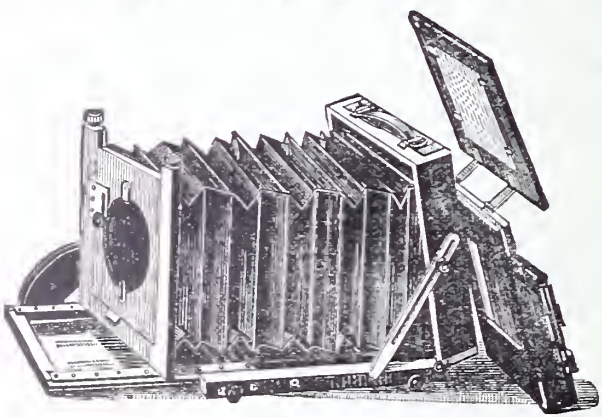
THE "COMPACTUM" 1892.

Of first-class quality and workmanship, double extension, with back sliding to front for W.A. Lenses, with rising and falling front, adjusted instantly by spring catches, horizontal and vertical swing back, and rack and pinion focussing, reversing back, together with three best double dark slides, with spring catches and light-tight hinged shutters. New patent turntable top fitted in base, and best threefold tripod stand, complete.



6½ × 4¾	... ...	£8	5 0
8½ × 6½	... ...	10	10 0
10 × 8	... ...	13	15 0
12 × 10	... ...	15	10 0
15 × 12	... ...	18	18 0

OUR SPECIAL FOLDING CAMERA.



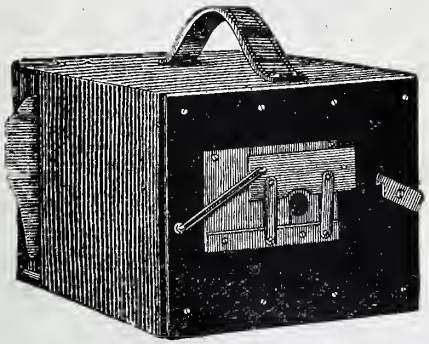
Prices with three double-backs, with spring catches.

6½ × 4¾	... ...	£5	0 0
8½ × 6½	... ...	6	10 0
10 × 8	... ...	9	10 0
12 × 10	... ...	12	10 0
15 × 12	... ...	14	10 0

This Camera is made in polished mahogany, first-class finish, half-plate, folding into 8 by 8 by 2½, it extends from 21in. to 15 inches, having swing front and back, reversing frame, rack and pinion for focussing; for use with wide-angle lenses, the back is moved forward to end of base-board.

R. J. APPLETON & CO.,

58, MANNINGHAM LANE, & 11, LEEDS ROAD, BRADFORD



OUR DETECTIVE HAND CAMERA

THE "MARVEL" No. 1.

Covered with black, and fitted with achromatic lens covering fully ¼-plate, patent shutter, and one double dark slide for quarter-plates, leather handle for carrying,

PRICE 10s. 6d., or with finder, 12s. 6d.

THE "MARVEL" No. 2.—Finished in polished wood, with one single slide, fitted with achromatic lens and patent shutter, and leather handle. Complete in box, with two bottles developers, plates, and box of hypo soda for **7s. 6d.**

A LARGE STOCK OF

Lenses, Cameras, Headrests, Backgrounds,
Printing Frames, &c., &c., always on hand.

IMPORTERS OF THE "GLOBE" ENAMELLER,

The finest Burnishing Machine made.

Special attention to Mount Orders.

Have you tried our own Sensitized and Preserved Albumenized Paper, 14/- per quire?

R. J. APPLETON & Co.,

58, MANNINGHAM LANE, & 11, LEEDS ROAD, BRADFORD.

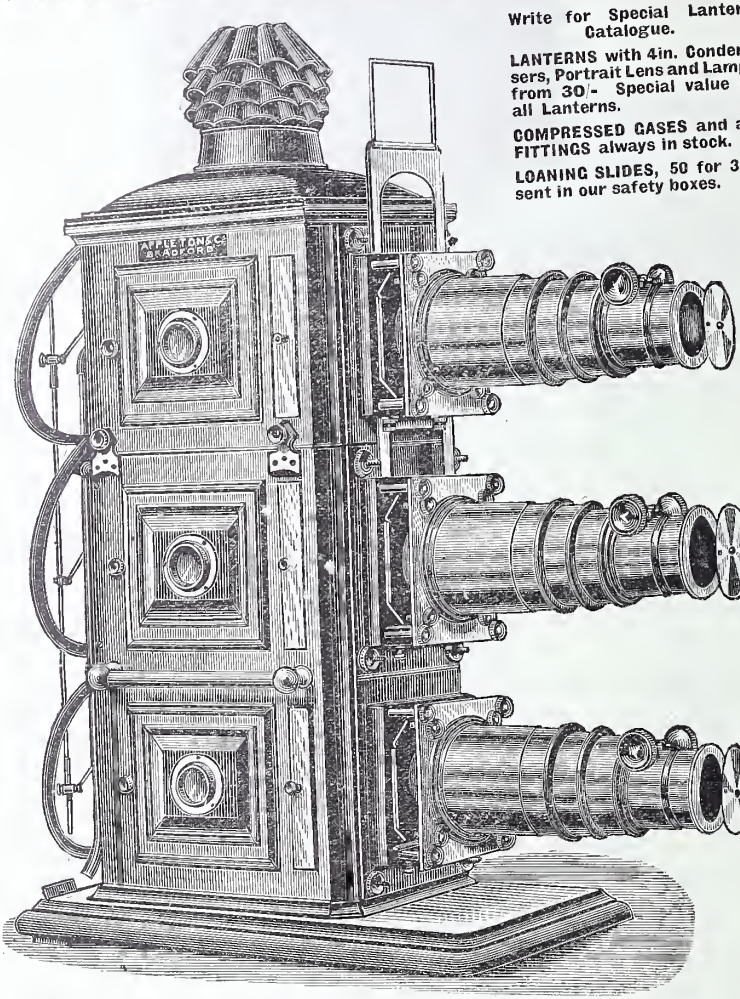
R. J. APPLETON & CO.'S
OPTICAL LANTERN DEPARTMENT.

Write for Special Lantern Catalogue.

LANTERNS with 4in. Condensers, Portrait Lens and Lamp, from 30/- Special value in all Lanterns.

COMPRESSED CASES and all FITTINGS always in stock.

LOANING SLIDES, 50 for 3/-, sent in our safety boxes.



ALL G. W. WILSON'S, and most other Makers' SLIDES kept in stock.

R. J. APPLETON & CO.,

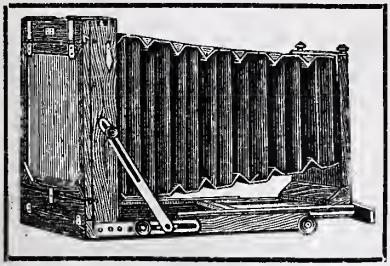
58, Manningham Lane, and 11, Leeds Road, BRADFORD.

TELEGRAMS:—"Optical, Bradford." TELEPHONE:—1559; 1559a.

ALBION ALBUMENIZING CO.,

PHOTOGRAPHIC MANUFACTURERS & DEALERS.

ESTABLISHED 1864.



TELEGRAMS: "*ALBUMEN, GLASGOW.*"

NEW ILLUSTRATED CATALOGUE ON APPLICATION.

We stock everything required for Photography.

Novelties always being added.

Correspondence invited & punctually attended to.

Sole Wholesale Agents for the "ATHENÆUM" Lantern Slides (patented), equal to best hand painted at two-thirds price. Send for List and Prices.

CAMERAS.—**"Instantograph" Set,** including camera, one slide, lens, stand, and shutter: ¼-plate, **£2 2s.**; ½-plate, **£4 4s.** The **Lady's Camera** (lightest in the market): ½-plate and three slides, **£7 10s.** **"Albion,"** long and short focus, three slides, and every movement: ½-plate, **£7.** The **"Compact,"** with three slides, splendid value: ½-plate, **£4 2s. 6d.** **Stereo Camera** (6½ × 4¼), three slides; **£5 15s.**

HAND CAMERAS by all Makers. **Shew's,** with Taylor lens, three slides, **£7 17s. 6d.**

STUDIO CAMERAS.—The **New Camera and Stand,** working from two C.-D.-V.'s on ½-plate upwards: 12 × 10, **£27**; 15 × 12, **£30**; 20 × 16, **£37 10s.**; 24 × 18, **£50.** **Scovill Camera,** 8½ × 6½, **£8 15s.**; 10 × 8, **£10 10s.**; 12 × 10, **£13 10s.**; 15 × 12, **£19 15s.**; 24 × 20, **£32 10s.** **Universal,** 8½ × 6½, **£7 5s.**; 10 × 8, **£9**; 12 × 10, **£11 5s.** (with double swing).

STANDS (Studio).—**15/-, 25/-, 55/-** Table Stands, **£4 10s.** to **£9.** Folding, for field, two, three and four fold, **10/6** to **30/-** Very rigid four-fold, **20/-**

MOUNTS.—Many novelties. Send for samples. Quotations for printed and stamped Mounts on application. Gold Stamped Mounts supplied in seven to ten days. Mounting Boards, Line Mounts, Plate-marked Mounts (plain and bevelled), several varieties.

ALBUMENIZED PAPER.—We stock Trapp's, "Cross Swords," "S.S.," "Anchor," and "Three Star," which we can supply in pink, mauve, and white, on best terms. We strongly recommend "Albion," best 10 kilo, double, at **£5 5s.** per ream, **5/6** per quire.

ACCESSORIES.—Large selection of new Chairs, etc. Photos on application.

BACKGROUNDS.—Splendid selection of **New Grounds,** 8 × 8ft., **50/-** Also assortment of Grounds, 8 × 6, **12/6**; 8 × 7, **30/-** to **42/6.** Paper, 8 × 5, **5/-**

CHEMICALS.—Low cash prices for Gold, Silver, Pyro, Hydroklnone, Eikonogen, Rodinal, Hypo, etc.

TRAYS.—In Porcelain, Papier Maché, Ebonite, Celluloid, Enamelled Steel, and Wood with glass bottoms.

[*See next page.*

Albion Albumenizing Co.

LENSES.—The uniformly good quality of our Lenses has gained for them quite a reputation. They cannot be beaten even at much higher prices.

	¼-pl.	½-pl.	¼-pl.	10x8	12x10
Best quality Rapid Rectilinear.....	£1 16 0	£2 7 6	£3 10 0	£4 10 6	£6 10 0
Do. with Iris.....	2 6 0	2 16 0	4 0 0	5 2 0	7 5 0
Do. Wide Angle	—	2 2 0	3 3 0	4 0 0	4 10 0
Second quality Rapid Rectilinear...	0 18 6	1 3 0	2 0 0	—	—
Do. with Iris.....	1 5 0	1 10 0	2 10 0	—	—
Do. Wide Angle	—	1 17 6	2 10 0	3 10 0	—
R.R., Aluminium Mounting.....	—	2 0 0	2 8 0	—	—
Single Lenses	0 9 0	0 10 6	1 2 6	—	—

SPECIALTIES.—Rapid Euryscope, working at F/6—
5 x 4, £2 15 0 7 x 5, £4 0 0 8 x 5, £5 7 0 9 x 7, £7 17 0
Panoramic Wide Angle (Miniature Lens). Wonderful covering power—
Best quality..... ½-plate, £2 8 0 ¼-plate, £3 4 0 12 x 10, £4 10 0
Second quality..... „ 2 0 0 2 10 0 —

PORTRAIT.	C.D.V.	Cabinet.	½-pl.
Best quality	3 5 0	6 10 0	16 10 0
Second quality.....	2 2 0	5 5 0	9 10 0
CHEAP PORTRAIT	1 0 0	1 10 0	3 5 0

Also Lenses by Ross, Dallmeyer, Taylor, Taylor & Hobson, Beck, Wray, and other makers.

SHUTTERS.—Kershaw, Thornton-Pickard, Newman, Wooden Drop Shutter, Rebound Shutter, &c., at Low Prices.

DRY PLATES.—Verel's, Matchless, Cathcart, Wratten, Paget, Edwards, Mawson, Phœnix, Ilford, Barnet, Studio, Thomas, Castle, and any other makes on Short Notice and Best Terms.

STATIONERY.—Negative and Card Envelopes, Plain and Japanese Tissues, Post Wrappers, Drying Boards, Tissue, Envelopes, &c.

DOUBLE ALBUMENIZED

Pink, White, Mauve, and Matt Surface

DURABLE SENSITIZED PAPER

In Sheets, 13/6 per Quire, 7/- per ½-Quire, 3/9 per ¼-Quire, 2/- per ⅛-Quire.

AND

CELEBRATED READY-CUT.

C.-D.-V.—$3\frac{5}{8}$ x $2\frac{1}{4}$, 43 out of sheet. **CABINET.**—$5\frac{5}{8}$ x 4, 15 out of sheet.

		Quire Box,
Quarter-plate Size	(Cut 4 x 3)—28 out of sheet	Quire Box, **14/6**
Five-by-four Size	(Cut $4\frac{3}{4}$ x $3\frac{3}{4}$)—16 out of sheet	½ „ **7/6**
Half-plate Size	(Cut $6\frac{1}{2}$ x $4\frac{1}{2}$)—10 out of sheet	¼ „ **4/-**
Whole Plate Size	(Cut $8\frac{1}{4}$ x $6\frac{1}{4}$)— 6 out of sheet	⅛ „ **2/3**
Size to Suit, $7\frac{1}{4}$ x $4\frac{1}{2}$, 7 x 5, and $7\frac{1}{2}$ x 5 ...	(Cut 7 x $4\frac{1}{2}$)— 9 out of sheet	

Sample Sheet of any of the above, ONE SHILLING.

ALL CASH WITH ORDER, POST FREE.

96, BATH STREET, GLASGOW.

[See preceding page.

THEY ARE

"MATCHLESS"

SO IF YOU WISH TO EXCEL IN PHOTOGRAPHY USE

F. W. VÉREL & CO.'S

Dry Plates and Sensitized Papers

As used by the leading photographers throughout the kingdom.

FOUR FIRST MEDALS gained by Harold Baker, Esq., Birmingham, for exhibits taken on our plates.
NUMEROUS OTHER AWARDS.

IMPORTANT ANNOUNCEMENT. NOW READY.

THE "CATHCART" PLATE,

By an ENTIRELY NEW formula.

It is rapid, rich in silver, and develops quickly, producing most brilliant negatives. Prices per dozen: $4\frac{1}{4} \times 3\frac{1}{4}$, 1/-; $6\frac{1}{2} \times 4\frac{3}{4}$, 2/3; $8\frac{1}{2} \times 6\frac{1}{2}$, 4/3; 12 × 10, 10/6; 15 × 12, 18/- per doz.

WE ONLY ASK A TRIAL—THEY WILL DO THE REST.

OUR VARIOUS MANUFACTURES ARE:

30 & 60 TIMES PLATES.—They have a heavy body of Emulsion, and give perfect gradation of tone. 60 times specially rapid, suited for shutter work.
¼-plates, 1/6; ½-plates, 3/6; Whole Plates, 6/-; 10 × 8, 10/6; 12 × 10, 15/- per dozen.
15 × 12, 26/6 per dozen.

MATCHLESS PLATES.—At popular prices, to compete with other cheap makes. An all-round good Plate, and BEAT BY NONE at the money. Extreme rapidity.
¼-plates, 1/-; ½-plates, 2/3; Whole Plates, 4/3; 10×8, 7/3; 12×10, 10/6; 15×12, 18/- per doz.

CELLULOID FILMS.—They will be found thoroughly uniform, and are coated with our well-known 60 Times Emulsion. Special rapidity.
REDUCTION IN PRICES.
¼-plates, 1/6; ½-plates, 3/6; Whole Plates, 6/- per dozen.
We send these post free at the above prices on receipt of remittance.

Works: CATHCART, near GLASGOW.

[*See following page.*

F. W. VEREL & CO.

BROMIDE LANTERN PLATES.—These are fairly rapid, and can the used for Contact Printing or Reduction in Camera, giving very fine results.

CHLORIDE LANTERN PLATES.—For Contact Printing only. A great variety of tones can he got on them.

Prices for hoth the above, 1/- per doz., $3\frac{1}{4} \times 3\frac{1}{4}$.

MATT OPALS.—Make artistic Positives hy Development. Easily manipulated.

GREAT REDUCTION IN PRICES.

¼-plates ... ... 1/6 per doz.		½-plates ... ... 3/6 per doz.	
Ditto ... ... 1/- per ½ doz.		Ditto ... ... 2/- per ½ doz.	
¾-plates ... 6/6 per doz.	10 × 8 ... 12/- per doz.	12 × 10 ... 18/- per doz.	
Ditto ... 3/6 per ½ doz.	Ditto ... 6/6 per ½ doz.	Ditto ... 9/6 per ½ doz.	

15 × 12, 30/- per doz.; ditto, 16/- per ½ doz.; ditto, 8/6 per ¼ doz.

EXCELSIOR INTENSIFIER.—Excelled by none. Can he used successfully for local intensifications.

4 oz. Bottle, 1/6, post free 1/9; 8 oz. Bottle, 2/6, post free 3/-

Ready Sensitized Paper.

DOUBLE ALBUMENISED.



IN PINK, MAUVE, AND WHITE.

Our Paper is now known and used throughout the **whole kingdom.** It has been so uniform that every year the increase has been enormous, and we are again compelled to enlarge our works to enable us to keep pace with the demand. Customers can now depend on having all orders executed promptly. To avoid stretching the cut, paper is all cut one way, the length out of the hreadth. All sizes up to ¼-plate have round corners. In sheets, **13/6** per Quire, **7/-** per ½-Quire, **3/9** per ¼-Quire, **2/-** per ⅛-Quire, post free. Cut C.D.V., 43 pieces; Cabinet, 15 pieces; ¼-plate, 28 pieces; ½-Plate, 10 pieces; Whole-Plate, 6 pieces to sheet. **14/6** per Quire, **7/6** per ½-Quire, **4/-** per ¼-Quire, **2/3** per ⅛-Quire, post free.

MATT SURFACE PAPER FOR PLATINUM TONING.

13/6 per Quire, **7/-** per ½-Quire, **3/9** per ¼-Quire. All Cash with order only.

Three sheets and toning solution, **5/-**; six sheets and toning solution, **8/6**.

SAMPLE SHEET, any above, Post Free, **1/-**.

Price Lists Free on application. Dealers should write for our terms.

Works: CATHCART, near GLASGOW.

[See preceding page.

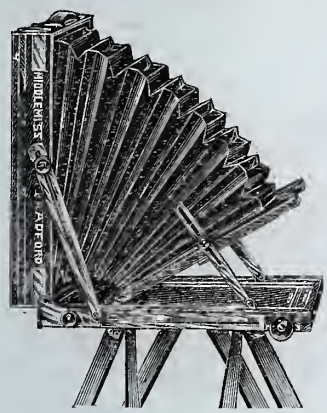
W. MIDDLEMISS,

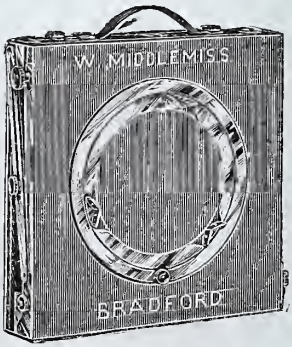
WHOLESALE MANUFACTURER,

ALICE ST., BRADFORD.

SPECIALITIES:

THE CRITERION PATENT CAMERA.





This Camera is acknowledged to be one of the most perfect made. It has every movement required in a portable Camera, and closes up into the smallest possible space, every detail having been carefully thought out. The Camera and double backs are made of selected Spanish Mahogany, and all the parts are finished in the most careful manner.

PRICES:

CAMERA AND THREE BOOK SLIDES.

½	1/1	10 x 8	12 x 10	15 x 12
£6	£7 5/-	£8 15/-	£10 10/-	£12 15/-

EXTRA THREE-FOLD TRIPOD & PATENT TURNTABLE.

£1 5/- £1 10/- £1 15/- £1 17/- £2.

SUPERIOR WATERPROOF BAG TO HOLD CAMERA & THREE SLIDES.

£0 17/- £0 18/- £1 1/- £1 4/- £1 7/-

W. MIDDLEMISS,

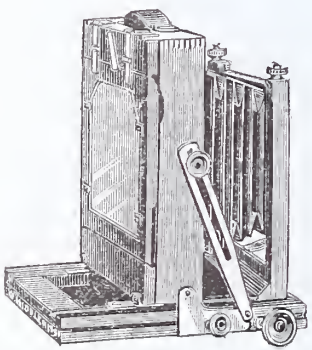
Wholesale Manufacturer,

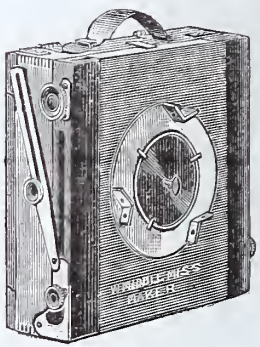
ALICE STREET, BRADFORD.

SPECIALITIES.

THE

"POPULAR" CAMERA.





THIS Camera is introduced to meet the demand for a really good article at a moderate price. It closes up into the smallest space, has all the modern improvements, and is well made in every part. It comprises long and short focus, swing back, reversing back, rising and falling front. It has rack and pinion focussing, leather bellows, and each camera is fitted with three double slides of the best workmanship.

PRICES.

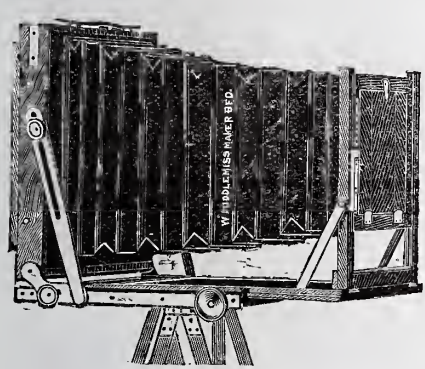
	½-plate.	¼-plate.	10 × 8	12 × 10	15 × 12
Camera, and three patent slides	£4 0 0	£5 5 0	£6 12 0	£8 2 0	£10 2 0
Camera, and three book slides	4 15 0	6 0 0	7 10 0	9 0 0	11 0 0
Three-fold Tripod, and patent top..	1 2 0	1 3 0	1 4 0	1 6 0	1 8 0
Waterproof Bag, to hold Camera and three slides	0 15 0	0 16 0	0 18 0	1 0 0	1 2 0

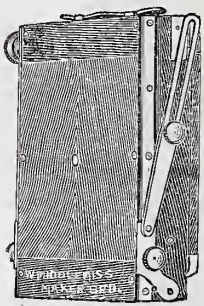
W. MIDDLEMISS,

Wholesale Manufacturer,

ALICE STREET, BRADFORD.

THE "MARGUERITE" CAMERA.





THIS Camera is designed specially for the use of ladies or those requiring a very light and portable instrument. It has all the movements of the preceding cameras, is made of the finest Spanish mahogany—all the parts are finished in the best possible manner.

PRICES.

	½-p.	¼-p.
Half-plate camera, and three patent slides	£4 15 0	£6 0 0
Half-plate camera, and three book slides	5 10 0	6 15 0
Weight of ½-p. camera, three slides, tripod and bag, 9lbs.		
Four-fold tripod and patent top	1 2 0	1 4 0
Waterproof bag, to hold camera, slides, and tripod	0 17 0	0 19 0

OTHER SIZES QUOTED ON APPLICATION.

W. MIDDLEMISS,

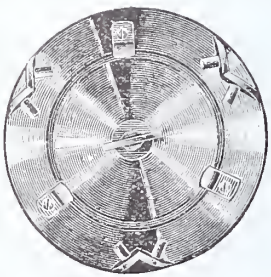
Wholesale Manufacturer,

ALICE STREET, BRADFORD.

SPECIALITIES.

MIDDLEMISS' PATENT TRIPOD TOP.

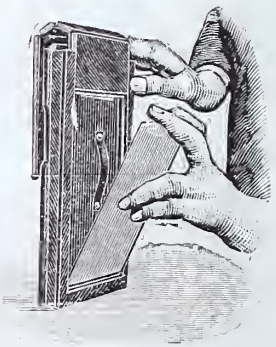
May easily be attached to any Camera.



PRICES.

½-pl.	¼-pl.	10×8	12×10	15×12
8/6	10/6	12/3	14/-	17/-

MIDDLEMISS' PATENT DOUBLE SLIDE.



PRICES.

½-pl.	¼-pl.	10×8	12×10	15×12
11/-	14/-	17/-	21/-	27/- each.

RENDELL'S PATENT

LANTERN SLIDE PRINTING FRAME.

This Frame is by far the simplest and most effective Frame made for the purpose of Printing Lantern Slides in contact.

PRICE **3/-** EACH. FREE BY POST **3/4½** EACH.

STROUD & RENDELL'S

Patent Scientific Lantern.

IN TRAVELLING CASE, COMPLETE .. .. **£8 12s.**

STROUD & BARR'S PATENT

LANTERN SLIDE COPYING APPARATUS.

PRICE, COMPLETE, **£8.**

DESCRIPTIONS ON APPLICATION.

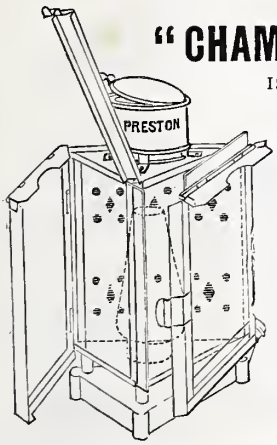
LENSES BY ROSS, DALLMEYER, BECK, WRAY, SWIFT, ETC., FITTTED TO CAMERAS.

WHY RISK FOG WITH FALSE-COLOURED LAMPS?

THE C.P.S.

"CHAMELEON" DARK-ROOM LAMP

IS THE PERFECT NON-FOGGING LAMP.



It is a Three-cornered Lamp; the *back* has a sliding ventilated door, fitting over the outside arm of the wick regulator. The side A has a *double flashed* RUBY and YELLOW glass removable; inside this, a piece of FINE OBSCURED GLASS. B. The *other side* has a removable *deep* RUBY glass C outside; inside this, an ORANGE glass, D. The size of the separate sides of light is $6\frac{1}{2} \times 5$; $6\frac{1}{2} \times 5$.

Price, for PARAFFIN, **10/6**; per post in box, **11/6**
" GAS ... **15/-**; " " **16/-**
Larger sizes, with *hinged* frames and 8 x 5 glasses, **25/-**
Per post in box, **27/3**

A New and Improved Indian Chameleon Lamp, with *loose* Interchangeable Glasses, now ready, **35/-** each; small size, binged and *clasping at front.* **30/-** (per post **1/6** extra). (*Vide* Illustration.)

T. H. M. (M.D.) writes:—"I have tested the glass, and find it more *non-actinic* than ordinary ruby glass. In the lamp it transmits a *better working light, and after development there is no trace of fog.*"

"C.P.S." Special Ventilated Dark Tent



THIS SHOWS ROOF STAYS, &c.

Has a working space of 33 inches from right to left when extended on a table (the rigid part is 18 inches long by 12 inches broad and 12 inches high, the remainder flexible). Admits half the body, covering 48 inches from back to front.

It has a special and efficient Ventilator.

May be used on a Tripod Stand for outdoor work. *When so required, we attach Special Blocks for the purpose.* (*Vide* Woodcut.)

Price **21/-**; per post. **22/-**; or with Roof Stays, Inlet with Clamp and Outlet Tubes, Funnel and Stand **31/6**; per post, **32/6**. Larger size, 24 x 18, **31/6**; or with extras, **42/-**; postage, **1/-** extra.

Tripod, 15/- extra.

R. A. B. says:—"I have found your Dark Tent of great use during a yachting cruise."

G. D. P. says:—"It is quite the best kind of tent I have yet seen, and I am very much pleased with it."

J. PRESTON

(Late Cubley & Preston),

CHEMIST & PHOTOGRAPHIC DEALER,

4, HIGH ST., SHEFFIELD.

GERMANY. GERMANY.



ROMAIN TALBOT,

46, KAISER WILHELM STRASSE, BERLIN, C.

Sole Agent for Eastman, Autotype, Platinotype Co., Edwards & Co., Watson & Sons, York & Son, Thomas & Co., and Marion & Co., all of London; Smith & Pattison, Chicago; Green, of Berwick; Tylar, of Birmingham; Green Bros., Grasmere; Marsh, Bogner; Phenix Plate Company, and many others.

MANUFACTURER, DEALER, & EXPORTER IN ALL

PHOTOGRAPHIC, PHOTOTYPIC,

AND

ETCHING ARTICLES.

Manufacturer of Talbot's Celebrated "BETA," "DELTA," and "CELLOIDIN"

ARISTO-CHLORIDE PAPERS.

TALBOT'S PIZZIGHELLI PAPER

(Printing-out Platinum Paper.)

TALBOT'S FERROPRUSSIATE PAPER

(In Cut Sheets and Rolls.)

General Agent for Europe of the "Union," "Champion," "Phenix," "Centennial" FERROTYPE PLATES, of Phenix Plate Co., Worcester.

SOLE MANUFACTURER OF THE

LAMPRODYNAST AND STANDARD LENSES.

SPECIALITY IN

PLAIN PAPER FOR ARISTOTYPE FERROPRUSSIATE

And all other processes.

Special Arrangements for Developing and Printing the Eastman Kodaks at Company's Prices.

LARGE DARK ROOM FOR TRAVELLERS.

Large Stock in PLATES, PAPERS, CHEMICALS, &c., &c.

SPECIALITY IN

PHOTOTYPIC & ETCHING ARTICLES.

Zinc Plates, Lined Paper, & Lined Glass Sheets.

ASK FOR CATALOGUE IN ENGLISH LANGUAGE.

IVORY

Address

Tablets

AND

SLIDE NUMBERS.

IVORY

LETTERED

FOR

ALL PURPOSES.

LETTERING BY PATENT PROCESS.

"PERFECT AND PERMANENT."

Lettering on Ivory.

Adopted by the Principal Camera Makers throughout the United Kingdom.

The ENDOLITHIC IVORY CO., Ld.

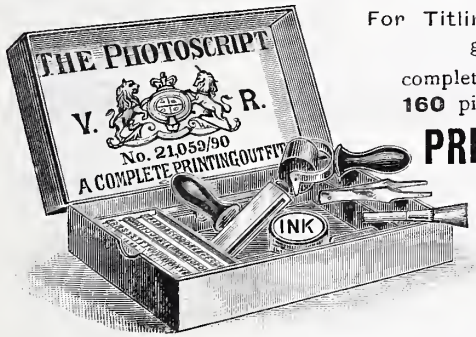
POMONA BUILDINGS,

61½, Fore St., London, E.C.

(Adjoining Moorgate Street Station.)

THE "PHOTOSCRIPT"

V.R. PATENT 21,059/90.



For Titling and Numbering Photographic Negatives.

complete Printing Outfit, containing **160** pieces of Type, etc., etc., etc.

PRICE 8s., post free.

SPECIMEN PHOTO AND FULL PARTICULARS FREE.

AGENTS WANTED

THE ONLY PATENTED OUTFIT, ACCEPT NO OTHER.

P. A. LINDNER,

PATENTEE, MANUFACTURER & IMPORTER,

170, FLEET ST., LONDON, E.C.

TO PRODUCE NAMES, TITLES, ETC., ON PHOTO PRINTS.

USE PATENT **"NAMEIT."** USE PATENT

"NAMEIT" consists of a fount of Metal-bodied Rubber-faced Letters, made the reverse way. The title is set up in the Holders supplied, and is then printed on the Negative, so that each print taken from the negative bears its own insignia, giving a business-like finish to the photo not attainable by any other method. The letters can be altered at will to any desired wording, thus supplying the means of titling innumerable negatives at a trifling cost.



No. 3 Outfit contains 207 letters, figures, etc. Price complete, 12 6 post free.

No. 4 Outfit contains 131 letters, figures, etc. Price complete, 8 6 post free.

Full particulars, and Specimen Photo showing result of process, free.

A. GRAY

(P.A. DEPT.),

44, Snow Hill, LONDON, E.C.

FRED V. A. LLOYD,

SUCCESSOR TO H. NEWTON & CO.,

WHOLESALE & RETAIL

OPTICAL AND PHOTOGRAPHIC DEPOT.

NEWTON'S "ORTHOPANACTINIC" LENSES

Can be had on three days' approval on receipt of value.

Dealer in Cameras, Pure Chemicals, &c.,

Dark Room for Amateurs' use. Lessons in Photography free.
Export Orders promptly attended to.

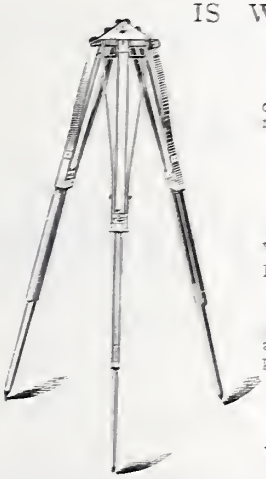
New Illustrated Catalogue free on application. *Established 1851.*

5, SOUTH JOHN STREET, LIVERPOOL.

ASHFORD'S IMPROVED PATENT

SLIDING ADJUSTABLE STAND

IS WITHOUT A RIVAL.



The Illustration is of the Three-fold Pattern, pronounced by competent judges to be the only rigid three-fold stand in the market. Before buying, see both kinds and judge for yourself.

PRICES.

Two-fold.		Three-fold.	
5ft. with 4in. top ...	18 6	5ft. with 6in. top ...	25 -
5ft. „ 6in. „ ...	21 -	5ft. „ 8in. „ ...	30 -
5ft. „ 8in. „ ...	25 -		

Waterproof Cases. Leather-bound, with Straps Complete.

For Three-fold Stands, 4/6 each; for Two-fold Stands, 5 - each.
Marion & Co., Agents.

For particulars of Ashford's **Guinea Detective Camera** one of the best made—see *Review of Reviews*, March 15th, 1892, and other specialities, send for Illustrated List, post free, to sole patentee and manufacturer.

J. ASHFORD,

179, ASTON ROAD, BIRMINGHAM.

ESTABLISHED 24 YEARS.

THE MANCHESTER PHOTO ENLARGING CO.

Send for PRICE LIST of

Enlargements

On Opals.
On Paper.
Collodion Transfers.
Argentic Bromide.
In Oils.
In Water Colours.
In Sepia.
In all Styles.
At all Prices.

A 12 × 10 Enlargement, Finished in Solid Oils, good work, 7/6.

C. A. MYERS,

Manchester Chambers, 46a, Market St., MANCHESTER.

When sending for Price List please quote "Photography Annual."

J. WALKER,

PHOTOGRAPHIC STORES

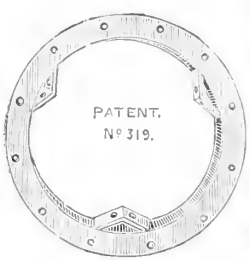
22, Charles Street, Bradford.

SPECIAL HALF-PLATE CAMERA

With Three Double Slides (book form), 80s.

FREE USE OF DARK ROOM.

4d. Licensees for the manufacture of McKellen's Patent Turntable.

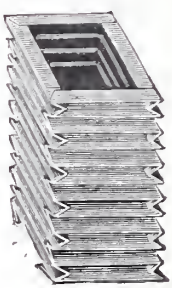


Post Free.



POST FREE 4d. WITH PRICE LIST OF FITTINGS, MATERIALS & WORKSHOP APPLIANCES. 400 ILLUSTRATIONS.

4d. Racks, Pinions, Screws and every requisite for Camera makers.



LONSDALE BROS.,

PHOTOGRAPHIC ENGINEERS, MANUFACTURERS & EXPORTERS OF CAMERA FURNITURE & APPARATUS,

Telegrams—"Fotobrass, Leeds." **3, Cookridge St., LEEDS.**

J. MARTIN & CO.,

PRINTERS AND ENLARGERS,

GENERAL PHOTOGRAPHIC WORKS,

NEW SOUTHGATE, LONDON, N.

PRICE + LISTS + FREE.

Large Consignments of Negatives by rail should be addressed New Southgate, Middlesex.

DOUBLE ALBUMENISED PAPERS

MANUFACTURED BY THE

Fabrikmarke.

Dresden Albumenising Co.

DRESDEN, GERMANY,

Schutzmarke

Are recognised to be the finest obtainable, and used by all eminent Artists in this country and abroad.

All Papers are albumenised on first quality Rives Raw Paper, and water-marked "B.F.K. Rives No. 74."

CAN BE HAD THROUGH ALL WHOLESALE DEALERS.

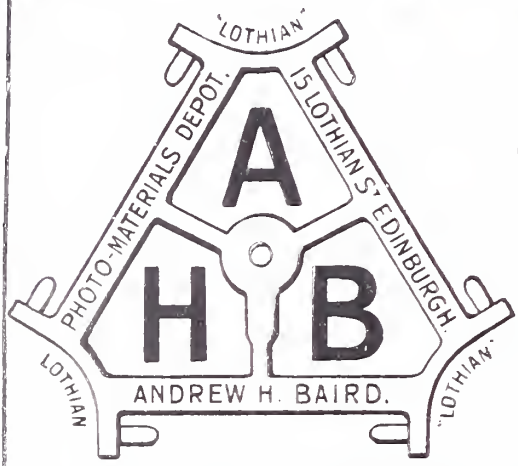
WHOLESALE ONLY FROM THE SOLE AGENT,

OSCAR SCHÖLZIG,

DASHWOOD HOUSE, BROAD ST., LONDON, E.C.

THE

'Lothian' Specialities



The "Todd-Forret" Magnesium Lamp (Patent).

The "Lothian" Universal Plummet (Patent applied for).

The "Lothian" Glass Etching Process (Patent).

The "Lothian" combined Mask and Binder, for Lantern Slides.

The "Lothian" Hand Camera (various styles.)

The "Lothian" Portable Syphon.

The "Lothian" Dark Slide, etc., etc.

Write for a CATALOGUE—new edition.

GEORGE MASON & CO.,

180 TO 186, SAUCHIEHALL STREET, GLASGOW.

THE BRITISH JOURNAL OF PHOTOGRAPHY says:—"In GEORGE MASON & Co.'s place we found the largest stock and greatest variety of novelties pertaining to the profession that it has ever been our experience to witness in one photographic warehouse. . . . As mount makers, paper and chemical importers, manufacturers, and general dealers in every class of photographic appliance, the name of this firm is 'familiar as household words.'"

The Best House in Scotland.
The Largest Stock in Britain.

EVERYTHING PHOTOGRAPHIC.

SEND FOR OUR

PHOTOGRAPHIC GUIDE, ILLUSTRATED CATALOGUE, & PRICE LIST,

COMPLETE IN ONE.

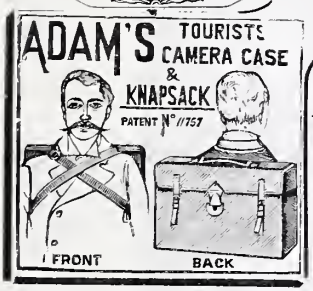
A handy Book for Professional or Amateur, price **1/-**, post free **1/3**.

GEORGE MASON & CO.,

180 to 186, Sauchiehall Street, Glasgow.

TELEGRAPHIC ADDRESS—"SODA, GLASGOW." TELEPHONE, No. 140.

CAMERA CASE,



WATERPROOF CANVAS.

From 3/6

To carry the Full Set complete.

The Trade Supplied. **Lists Free.**

ADAMS,

Manufacturer of Leather and Canvas Camera, Lens, and Stand Cases,

90, HATTON GARDEN, LONDON, E.C.

RESIDUES.

THE FULL VALUE OF ALL RESIDUES ALLOWED

By **D. & J. WELLBY.**

The ENTIRE RECOVERY of the SILVER & GOLD ENSURED

AT THE LEAST POSSIBLE EXPENSE.

NITRATE OF SILVER AND CHLORIDE OF GOLD

Of uniform good quality, the best that can be obtained (*Wholesale & Retail*).

D. & J. WELLBY,

18 and 20, Garrick Street, Covent Garden, London, W.C.

THE BEST SILVER PAPER IN THE MARKET.



WHITE, MAUVE, OR ROSE.

TO BE HAD FROM MOST DEALERS.

If you want a really good Half-plate Camera, send for

Watson's Reliable Camera.

Complete with Three Cocked Double Backs and every movement.

PRICE only £4 4/-

Nothing like it in the market under £5 10/- Also

Watson's Reliable R.R. Lenses

¼-plate, 27/-; ½-plate, 35/-; ¼-plate, 45/-

Every Camera and every Lens guaranteed, and money returned if not approved of. Send for one, or both, and you will not regret it.

WATSON, Photographic Chemist,

34, GRAINGER ST., NEWCASTLE-ON-TYNE.

W. E. PALMER & SONS, NEW BARNET.

Carbon Enlargements

BROMIDE ENLARGEMENTS

PLATINOTYPE & SILVER PRINTING.

PRICE LISTS POST FREE.

W. E. Palmer & Sons,

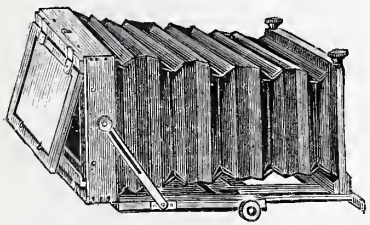
NEW BARNET, HERTS.

H. MOORSE

(Established over 25 years),

PHOTOGRAPHIC APPARATUS MANUFACTURER

TO THE GOVERNMENT,



154, High Holborn

(Near New Oxford Street and Museum Street).

The most genuine House in the Metropolis to get a good Camera cheap.

Finest Ground Glass, Cameras, Bellows, Printing Frames, Dry Plates, Papers, and Chemicals.

LIGHT CAMERA FOR AMATEURS.

Rack Adjustment, Long Focus, Leather Body, Reversible Frame, with one Double Back.

Size	$4\frac{1}{4}\times3\frac{1}{4}$	$6\frac{1}{2}\times4\frac{3}{4}$	$8\frac{1}{2}\times6\frac{1}{2}$	12×10
Price	£2 10 0	£3 0 0	£3 12 0	£4 5 0
Extra Backs	0 6 0	0 9 0	0 14 0	0 18 0
Folding Stand	0 6 6	0 7 6	0 9 0	0 14 0
Rectilinear Lens	0 18 0	1 1 0	1 10 0	1 18 0
Bags for ditto	0 4 0	0 5 6	0 8 0	0 14 0
	£4 4 6	£5 3 0	£6 13 0	£8 9 0

This may be had together or separately.

For reply please send stamped envelope.

Pure Chemicals.

HINTON & Co

38 BEDFORD STREET
STRAND, W.C.

SEND FOR A PRICE LIST.

PHARMACEUTICAL AND PHOTOGRAPHIC CHEMISTS.

CHEMICALS

FOR THE

ARTS, SCIENCES, TRADES & MANUFACTURES.

Photographic Solutions, Varnishes, Mountants, &c.,

WHOLESALE AND RETAIL.

Hinton's Photographic preparations possess an original, advanced and distinctive character of their own; they are the *facile principes* of their class, and have successfully withstood, in all parts of the world, the tests of climate and of time.

THE BEST FORMS ONLY OF APPARATUS STOCKED.

Several Novelties are in course of Manufacture.

"I always admire the style in which you send out your work. Where DO you get supplied with those tasteful and handsome frames and cases?"

"My friend, just where I have always obtained them, from the oldest house in the trade,

"ELISHA MANDER & SON,
"Branston Street,
"BIRMINGHAM."

NOW READY.

PRACTICAL ENLARGING

BY

JOHN A. HODGES,

VICE-PRESIDENT OF THE WEST LONDON PHOTO SOCIETY.

ILLUSTRATED.

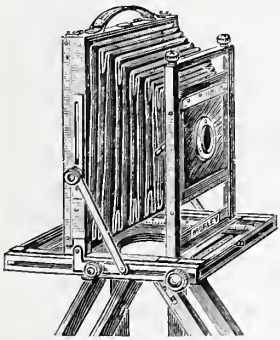
Paper Covers, price 1/-; post free, 1/2. A Cloth-bound Edition at 2/- will be ready shortly.

LONDON:

ILIFFE & SON, 3, ST. Bride Street, E.C.

Established 1843. Lists 3 Stamps.

NORTH LONDON PHOTOGRAPHIC STORES.



THE "FAIRY."

Lenses, Cameras AND *Apparatus,*

New & Second-hand, by the Best Makers.

ROSS' & DALLMEYER'S

A.B.C.D. & RECTILINEAR LENSES.

MORLEY & COOPER,

70, UPPER STREET, LONDON,

Manufacturers of the "Fairy," "Star," "Simplex," and High-class Field and Studio Cameras.

NEWMAN  NEWMAN

MANUFACTURER

OF EVERY ARTICLE FOR

THE PHOTOGRAPHIC COLOURIST.

THE ARTIST IN OIL COLOURS.

THE ARTIST IN WATER COLOURS.

OF SUPERIOR QUALITY.

24 SOHO SQUARE, LONDON.

Catalogues and Circulars Post Free.

WHEELER'S

Photographic Helps.

"PHOTOGRAPHIC ENLARGEMENTS HOW TO MAKE THEM."
Just published. Illustrated. Paper Covers, 1s.; by post 1s. 2d. A practical hand-book, containing instructions, original hints and the best information.

CARDBOARD MASKS FOR UNDEVELOPED PLATES. Thorough protection.
50 in the box, ¼ plate, 6d.; 5 x 4, 9d.; ½ plate, 1s. "They are excellent." *Paul Lange.*

ANTI-HALATION PAPER (Registered) for Backing Plates.
In boxes, all sizes. Applied quickly and prevents pinholes in the negative.

GELATINO-CHLORIDE BACKING PAPER, preserves the gloss, all sizes.
In boxes of 100 sheets. Recommended by Mr. Howson, of the Ilford Company.

PHOTOGRAPHIC PRINT CASES, FOR THE POCKET. Very handy and neat.
12 chemically pure leaves, cloth, lettered. ¼ plate, 6d.; 5 x 4, 9d.; ½ plate, 1s.

EXPOSURE REGISTER AND TABLES - COMBINED. (6th Edition).
The best Register published. Exposure found in an instant. Cloth, 1s. Post 1d.

PHOTOGRAPHIC BLOTTING BOOK (Copyright). The only reliable blotting.
Chemically pure paper, made in 5 sizes; ¼ plate, 4d.; ½ plate, 6d, post extra.

CELLULOID STORAGE CASES, LIGHT-TIGHT. Perfect security.
Cloth covers, containing non-injurious paper; ¼ plate, ½ plate, and ¼ plate.

MODERN PHOTOGRAPHIC LABELS (6th Edition).
New forms, gummed and interleaved. The best set published. 6d., post, 1d.

BROMIDE PRINTING REGISTER (2nd Edition). For recording exposures.
Suitable for bromide and Alpha paper, lantern slides, &c., cloth, 1s.

NEGATIVE PRESERVATIVE PAPER. 500 Sheets, ¼ pl., 4d.; ½ pl., 8d., and so on.
An unbleached pure paper, for placing between negatives. All sizes.

READY-MARKED LANTERN-SLIDE MASKS. [Send for list
All Contact and Reduction shapes, 80 in 1s. box, &c., &c.

May be had from the Photographic Dealers, or

GEO. WHEELER & Co., Manufacturing Stationers, 46, King Street West, MANCHESTER.

PHOTOGRAPHS

CHEAPER BOUGHT THAN MADE YOURSELF.

5,000 LANDSCAPE PHOTOGRAPHS, 7 × 5 inches, 2/- per dozen.

DETAILED LIST AND SAMPLE, POST FREE, 2d.

TERMS FOR PRINTING FROM NEGATIVES ON APPLICATION.

TRADE TERMS ON RECEIPT OF TRADE CARD.

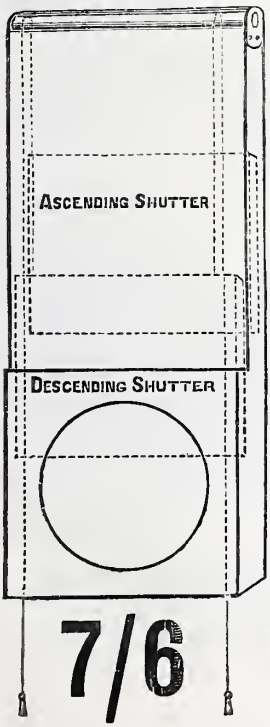
10,000 Lantern Photographs, 6d. each, Landscapes, Humorous Subjects, Biblical, Moral, Temperance and Scientific, Mechanical Slides, New Wheel of Life giving the true Movements of Animals, Portable Lantern Slides, 50 weighing less than 1lb. Sample post free, 9d.

LIST OF SUBJECTS FREE.

A. PUMPHREY,

PHOTOGRAPHIC PUBLISHER,

62, STANHOPE ST., BIRMINGHAM.



PLACE'S PATENT PHOTOGRAPHIC EXPOSING SHUTTER.

This Shutter continues to hold its own against every Shutter in the market.

A FEW OF THE REASONS WHY.

It is simple in make, and effective in use.
It is light and portable.
It will give short and long exposures.
It opens and closes on the foreground, enabling the Photographer to get splendid clouds in Land and Seascapes.

Price, to fit hood up to 2in., **7/6**; over 2in., **10/6.**

SENT ON APPROVAL.

When ordering it is best to send the hood of the lens, if not, lay the hood on a card and scratch round with a point.

Manufacturer of Best Optical Lanterns and Apparatus.

J. PLACE, 13, Bull St., Birmingham

"GIVE IT A NAME."

SHARP & HITCHMOUGH'S
"APTUS" NEGATIVE NAMING OUTFIT,

Consisting of DIVISIONAL CASE, containing—

140 Letters in Patent dovetailed Metal Body or Rubber-faced Type.
21 Figures.
10 Points.
45 Spaces.
1 Holder.
1 Tin of Ink.
1 Pair of Tweezers, and all necessary sundries, with full directions for numbering and naming negatives.

10/6.

Post free 6d. extra.

PLEASE NOTE

THAT our type is non-reversed, consequently may be used for any kind of printing on paper, wood, cloth, and for endorsing negatives.

MOREOVER the Aptus Rubber Type can be obtained in many and various sizes and descriptions of type.

OWING to the type being non-reversed, it is not only cheaper, but adapts itself to all uses.

Before purchasing, obtain full particulars of the **Aptus Magazine Camera,** 12 plates carried in sheaths, released in as many seconds with one operation. Achromatic Lens working at large aperture, Time and Instantaneous Shutter. **Price 30/-.** Specimen picture on application.

TO BE OBTAINED FROM ALL DEALERS, OR FROM

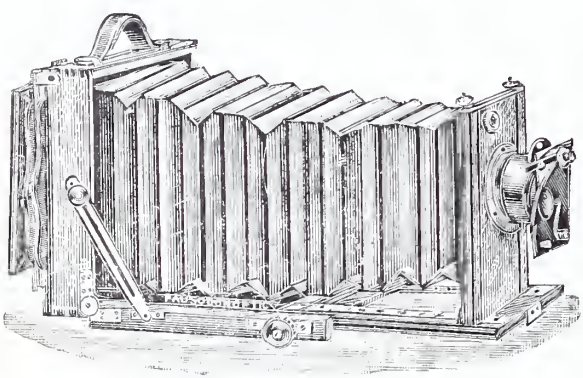
SHARP & HITCHMOUGH, PHOTOGRAPHIC SPECIALITY MANUFACTURERS,

101 & 103, DALE STREET, LIVERPOOL.

Telegraphic Address—"APTUS FINDER, LIVERPOOL." **Telephone No. 2495.**

PAUSODONOPTIC.

EXCELSIOR.



Double extension, practically square bellows, with rising and falling front; double swing and reversing back, rapid lens, instantaneous shutter. 1 double dark slide, with patent spring catches. Rigid two-fold stand. Everything thoroughly well made and beautifully finished.

½-plates, £2 12s. 6d.
½-plates, £4 10s. 0d.

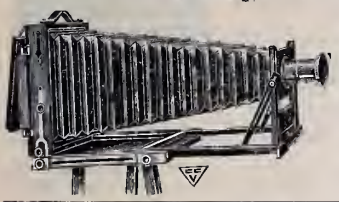
WRITE FOR LISTS, FREE.

WOOD BROS., LONDON.

73, LORD STREET, LIVERPOOL.

VEVERS' SPECIALITIES FOR 1892.

VEVERS'S PATENT "PERFECTION" CAMERA.



Unlike most long-extension Cameras, this instrument has been designed on altogether original lines, with the result that the acme of efficiency and portability has been attained; every possible movement of utility being combined with the utmost rigidity and lightness.

Centre swing back, swing front, reversing back, rising and falling front; back can be fixed to any part of baseboard; plummet, &c. Dark Slides are my improved hook pattern, having multiplex hinged shutters, side clasps and spring locks.

The whole is of the best material and finest workmanship procurable.

Size.	Camera and One Slide.	Extra Slides.	Turntable and three-fold tripod.	Brass Bound Extra.
4¼ x 3¼ (¼-plate)	£3 17 6	9/6	27/6	12/6
6½ x 4¼ (½-plate)	5 5 0	14/6	30/-	12/6
8½ x 6½ (1/1-plate)	6 10 0	19/6	35/-	15/-
10 x 8	7 15 0	22/6	40/-	17/6
12 x 10	9 0 0	28/6	45/-	21/-
15 x 12	11 0 0	37/-	50/-	25/-

Intermediate, larger and foreign sizes made to order. *Full illustrated description in New Catalogue. Post free, 2d.*

READY ABOUT JULY.—**THE "VEVEO" DOUBLE EXTENSION CAMERA.**

The "Veveo" has best long extension conical leather bellows, rack and pinion focussing adjustment, reversing and double swing back, rising front, changeable lens-board, plummet, &c. The back of the Camera can be brought forward, and instantly fixed at any part of the base-board—a necessary requirement for use with wide-angle lenses.

Notwithstanding the many improvements embodied in this new pattern, the prices, including one best book-form Slide, are fixed at the following very low rates:—

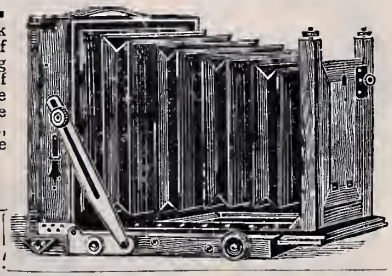
Size	¼	½	1/1	10 x 8	12 x 10	15 x 12
Price	55/-	75/-	105/-	140/-	175/-	200/-
Extra Slides.	8/6	13/6	18/6	21/-	27/6	36/-

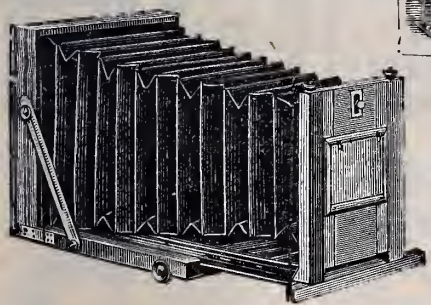
Turntable and three-fold Tripod, and other extras, same as "Perfection" Camera.

VEVERS' "POPULAR" CAMERA.

Best double extension leather bellows, rack and pinion, swing and reversing back, front of Camera attachable to any part of extending frame, and back can be brought to front of baseboard for wide-angle lenses. We have greatly improved this well-known and favourite pattern, and, owing to the increased demand, have been enabled to considerably reduce the price as below.

Size ...	¼	½	1/1	10 x 8	12 x 10	15 x 12
Price...	50/-	63/-	75/-	110/-	140/-	170/-





THE "DEFIANCE" CAMERA.

Designed to meet the demand for a long-focus Camera, at the lowest possible price.

Double extension conical bellows, rack and pinion, swing and reversing back, sliding front and double dark Slide.

MADE IN TWO SIZES ONLY:

¼-plate, **27/6**; ½-plate, **38/-**

CAMERA FITTINGS & BELLOWS at very low prices.

REPAIRS. Being actual makers, we are in a position to undertake Repairs and Alterations with the utmost despatch, and at lowest cost. Special Apparatus and Inventor's Models made to order.

Complete Illustrated Catalogue, with 1892 Summer Supplement, post free, 2d.

C. C. VEVERS, 12, MARKET STREET, BRIGGATE, LEEDS.

VEVERS' RAPID RECTILINEAR LENSES.

Although so remarkably low in price, these lenses will be found to be equal to the most expensive. Work at *f*/8, with set of Waterhouse stops in case; loose hood; focal length engraved on mount, etc.

To cover	...	...	¼	½	1	10 x 8	12 x 10	15 x 12
Approximate focus			5¼	7½	10	12	16	20in.
Price	...	...	18/6	25/-	32/6	60/-	75/-	105/-





VEVERS' "DETECTIVE" RAPID RECTILINEAR.

¼-plate, 4½in. fixed focus, *f*/8. Price 8/6. Postage 2d.

No. 1. Single Lens. Sliding mounts, ¼-plate, 3/6; ½-plate, 7/6; 1-plate, 12/6.
No. 2. Single. Rigid mounts, rotating stops, 5 x 4, 10/-; 7 x 5, 12/6, 9 x 7, 17/6 12 x 10, 30/-
No. 3. Rapid Single. F/8, Waterhouse stops, ¼, 12/6; ½, 17/6; 1, 25/-; 10 x 8, 30/-; 12 x 10, 40/-
Wide-angle Rectilinear. ¼, 24/-; ½, 30/-; 1, 42/-; 10 x 8, 58/-; 12 x 10, 65/-; 15 x 12, 90/-
Euryscope. F/6, ¼, 35/-; ½, 50/-; 1, 65/-; 10 x 8, 85/-; 12 x 10, 100/-
Portrait. Superior quality, rack and pinion, Waterhouse stops, ¼-plate, 20/-; ½-plate, 40/-
Stereoscopic Prisms. Small, 6d. pair; 4/6 doz. pairs. Large, 1/- pair; 10/- doz. pairs.
Compound Condensers. For enlarging, etc., 3½in., 7/6; 4in., 8/6; 4½in., 15/-; 5in., 20/-; 6in., 32/-; 8in., 54/-; 10in., 110/-; 12in., 180/- *Full particulars of all the above in catalogue.*

TRIPOD STANDS, from 1/6 to 30/- A great variety—folding and sliding; 1-fold, 2-fold, 3-fold and 4-fold.

SHUTTERS.



Rebounding Shutters, ¼-pl., 1/6; ½, 2/6.
Drop Shutters. 2in., 2/6; 3in., 3/6.
Pneumatic Drop. A capital shutter with cork back, 4/6
Roller Blind, with cork backs, 2in., 3/-; 3in., 5/-
Particulars of a great variety of more expensive patterns will be found in catalogue.





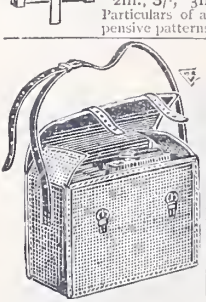
VEVERS' "PYRAMID" CHANGING BAG.

Hangs under Tripod.

Perfectly light-tight.

½-pl., 10/-, ¼-pl., 15/-

"THE COMPACTUM" CHANGING BAG.
Square Form with elastic sleeves.
¼-plate, 5/-; ½-plate, 7/6; 1-plate, 10/-



CAMERA CASES.

Check Pattern. Waterproof, ¼, 3/6; ½, 5/-; 1, 7/-;
Canvas. Leather bound, lined ¼, 4/-; ½, 6/6; 1, 9/6.
Stiff Canvas. Lock and key, etc., ¼, 7/6; ½, 10/-; 1, 13/6.
Leather. Lock and key, etc., ¼, 10/-; ½, 15/-; 1, 20/-

DARK SLIDE CASES.



Cloth covered, flannel lined,
¼-pl., 6d.; ½-pl., 9d.; 1-pl., 1/3 each.

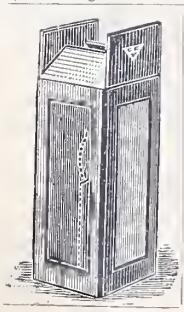
IN TWELVE COLOURS:







Yellow, Pink, Green, Cerise, Orange Ruby, Ultramarine, Silver, Bronze, Olive Green, Black (one side), and Black (both sides).
6*d. per Box, post free* 8*d.*, or in packets of 20 any one shape and colour 2d., post free 3d. Cushion, circular, oblong, oval and dome.



VEVERS' COLOURED LANTERN SLIDE BINDERS.

In six colours. Orange, Green Lilac, Pink, Blue, and Deep Bronze Blue.
Packed in neat box, 6d. per 100. Post free, 8d.

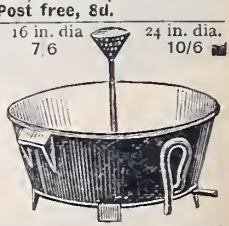
VEVERS' FOLDING RUBY LAMP.

Windows "glazed" with orange and ruby fabric. Can be used with an ordinary bedroom candle, and folds perfectly flat for travelling.

Price 6d. Post free, 8d.

Superior quality, metal top and bottom, in case, 2/- Postage, 3d.

16 in. dia. 7/6 — 24 in. dia. 10/6



VEVERS' "RAPID" PRINT WASHER.

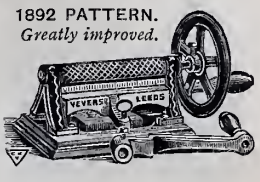
Double rose spray, syphon, &c.

C. C. VEVERS, 12, Market St., Briggate, LEEDS.

VEVERS' CELEBRATED BURNISHERS.

HAVE A LARGER SALE THAN ANY BURNISHER IN THE WORLD.

1892 PATTERN.
Greatly improved.



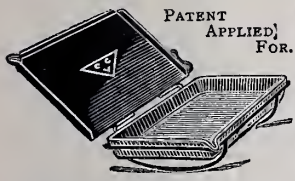
Length of Roller	5in.	6½in.	8in.	9in.	11in.	13in.	15in.	18in.
Price	5/-	10/-	12/6	14/6	20/-	25/-	30/-	45/-

Above prices include Bunsen Gas Burner. Spirit Lamps from 10d. each extra.

Packing cases from 4d. Printed instructions with each.

For full particulars and Hints on Burnishing, see Catalogue, 2d.

VEVERS'
COMBINED DEVELOPING DISH ROCKER AND SCREEN.



PATENT APPLIED FOR.

Decidedly the most useful and practical Novelty for the Dark Room ever invented.

It consists of a light frame on rockers, upon which the developing dish rests. At one side is hinged (the hinges being adjustable to allow for the depth of the dish) a japanned tin screen or lid, which closes down over the dish, thus effectually protecting the contents from extraneous light. This screen can be raised in an instant for the examination of the negative; while the developer can be kept in constant motion by a gentle touch of the rocking frame every few minutes.

PRICES:

	½	½	¼
Combined Rocker and Screen	1/9	2/6	3/6
Ditto, complete with celluloid dish	2/4	3/6	5/-
Ditto ditto shallow porcelain	2/3	3/2	4/5

When ordering, please give outside dimensions (top and bottom) of dish to be used.

"Practical Amateur Photography."

Fully illustrated. Two sheets of gummed chemical labels, and a photographic frontispiece. In addition to clearly written instructions for beginners, this book contains directions for working *all* the latest processes, thus making it far away the best manual for amateur photographers. "A splendid little work—most practical and complete The little wrinkles and dodges in the book make it particularly valuable."—*Philadelphia Photographer.* Most favourably reviewed by the entire photographic press. **Price 6d., or post free 7d.**

VEVERS' CATALOGUE

Not only includes every description of Photographic Apparatus, Materials, and Chemicals, at prices much below any in the market, but contains more **Useful Novelties** than any other. It is sent **post paid** to any address in the world, together with

1892 Summer Supplement,

Forming a perfect Encyclopædia of Photographic Apparatus to date, for **2d.** in stamps.

Vevers' Quarterly Second-hand List,

Containing many bargains in Cameras, Lenses, Materials and Sundries, post free.

C. C. VEVERS, 12, Market Street, Briggate, Leeds.

(WHOLESALE AND EXPORT).

VEVERS' "WORKS" DEPARTMENT.

Size of Print.	PRINTING. SILVER. Plain out.	Vignette.	BROMIDE From one Negative.	MOUNTING. On Photo's own Mounts.	On Plain Toned Mounts.	On Gold Bevel Edge.	On Ind. Tnt. or Cx. Line.
C.D.V.	1/-	1/3	2/-	4d.	6d.	10d.	1/-
¼	1/4	1/7	2/-	5d	6d.	1/-	1/2
Cabt.	2/3	2/6	3/6	6d.	1/-	1/6	2/-
½	2/6	2/9	3/6	6d.	1/3	1/6	2/2
¼	4/6	5/-	6/6	1/-	2/-	2/6	3/-

Printing on every kind of Paper, up to 12 x 10, for prices see Catalogue.

Size.	ENLARGING. BROMIDE. Unmounted.	Mounted and Spotted.	On Opal	CARBON. On Paper. 1st Copy	Duplicates.	On Opal. 1st Copy	Duplicates.	FINISHING. Water-colours or Monochrome.	IN OIL.
Up to 10 x 8	1/6	3d.	4/-	4/6	9d.	6/-	2/-	From 4/-	From 5/-
12½ x 10½	2/-	6d.	4/6	5/6	1/3	8/-	3/-	5/-	6/-
15½ x 12½	2/6	6d.	6/6	8/-	1/9	11/6	4/-	6/-	8/-
18 x 15	3/-	9d.	13/-	11/-	2/6	17/6	7/6	7/6	10/-
20 x 16	3/9	10d.	16/-	12/6	3/-	24/-	9/-	8/6	15/-
23 x 17	4/6	1/-	21/-	15/-	5/-	27/6	13/6	9/6	20/-

Enlargements can be made from any size negative, but ¼ or ½-plate preferred.

OUR Specialities.

No. 1.
A 15½ x 12½ Enlargement, made and finished in solid oils in first-class style (not rubbish) and framed in superior Alhambra Gilt Frame for **£1.**

No. 2
A 12 x 10 Enlargement on Opal, beautifully finished in Monochrome and mounted on handsome bevelled Plush pad, with strut back, &c. **12/6**

PICTURE FRAMES made to order in every size, style and quality.

ENAMELLING Flat or embossed, tissue covered; C.D.V., 1/6; Cabinets, 3/- per doz.
For prices of Retouching, Copying, Developing, Intensifying, Toning, Burnishing, etc., etc., see Catalogue, price 2d.

SENSITIZED PAPER Best Extra Brilliant Double Albumenized Paper. Keeps 12 months easily. Prints quickly and yields brilliant tones in *any* bath. 1 sheet, **9d.**; 3 sheets, **2/-**; 6 sheets, **3/9**; ½-quire, **7/-**; 1 quire, **13/6.**
READY CUT: C.D.V., ¼, Cabinet, and ½-plate, **10d.** per sheet packet. Postage extra.

VEVERS' New Argentic-platinum Paper.
Prints like Albumenized Paper. Results resemble Platinotype.
1 sheet, **8d.**; ¼-quire, **3/6**; ½-quire, **6/6**; 1 quire, **12/-**
SPECIAL TONING SOLUTION FOR ABOVE, ONE SHILLING PER BOTTLE.

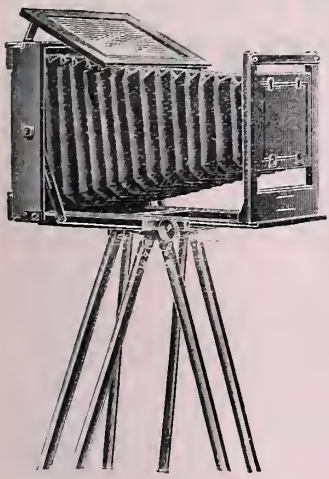
VEVERS' TRANSPARENCY PAPER
For Window Decorations, Hall Lamps, &c. Merely requires washing in water after Printing. Price **1/-** per sheet; ¼, **8d.**, ½, **1/3** per packet of 24.

FERRO-PRUSSIATE. 6d. per sheet; ¼, 6d.; ½-plate, 1/- per packet of 25.

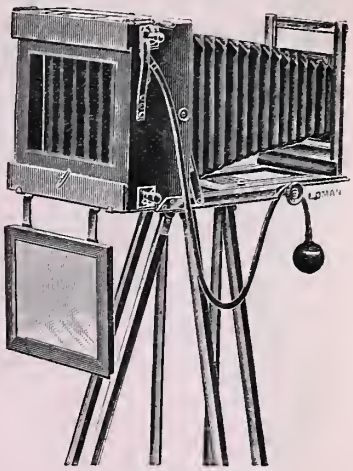
For full particulars of above, and hundreds of other novelties, see
Vevers' Complete Catalogue, 2d. post free.

C. C. Vevers, 12, Market Street, Briggate, Leeds.
(Wholesale Terms on receipt of Business Card.)

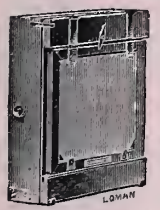
THE "HOLLAND."



"Holland" Camera open.



"Holland" Camera.
Showing Focal Plane Shutter which is detachable.



"Holland" Camera closed.

Loman's "Holland" Camera

Has conical leather bellows, horizontal swing and sliding front. The ½-plate Camera measures only when closed $2\frac{1}{16} \times 8\frac{1}{2} \times 8\frac{1}{2}$ inches; its weight is 3lbs., and the bellows has an extension of 16 inches. Wide-angle lens arrangement.

TO BE HAD FROM ALL DEALERS.

PRICES OF LOMAN'S "HOLLAND" CAMERA.

SIZES.	$4\frac{1}{4} \times 3\frac{1}{4}$in.	$6\frac{1}{2} \times 4\frac{3}{4}$in.	$8\frac{1}{2} \times 6\frac{1}{2}$in.	10 x 8in.	12 x 10in.	15 x 12in.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
"Holland" with 1 double back Ia.	3 6 8	3 15 0	5 8 4	6 5 0	7 10 0	9 3 4
"Holland" with 3 double backs Ia.	4 11 8	5 8 4	7 10 0	8 15 0	10 16 8	13 6 8
Focal Plane Shutter extra.	1 5 0	1 13 4	2 10 0	2 18 4	3 15 0	5 0 0
Turntable extra (to order).	0 16 8	1 0 10	1 5 0	1 13 4	2 1 8	2 10 0

The Shutter is detachable. In ordering please state whether "with" or "without" Focal Plane Shutter. Aluminium Fittings 10 per cent. extra.

LOMAN & CO. (90, Damrak), AMSTERDAM.

THE HAND CAMERA FOR 1892.

THE PATENT

"REFLEX" CAMERA

Is made in the following Standard Patterns:

A. The "Reflex" Hand Camera, ¼-plate, with 3 Double Dark Slides, R.R. Lens, Stops, and Rack and Pinion ... £10 0 0
Price with 1 Dark Slide ... 8 15 0

A.A A. The same Camera, with Taylor, Taylor & Hobson's special D Lens, fitted with Iris Diaphragm, and Rack and Pinion, 3 Slides ... £11 5 0
1 Slide ... 10 0 0

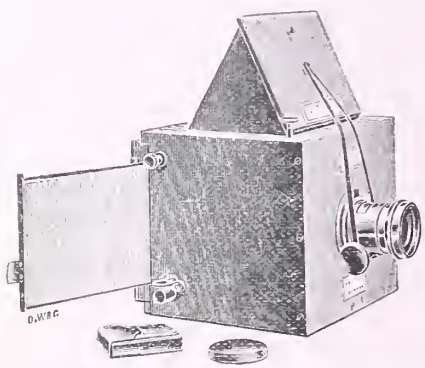
B. The "Reflex" Hand Camera, ½-plate, with 3 Slides ... £17 10 0
1 Slide ... 15 16 8

C.C. The "Reflex" Detective Camera, ¼-plate (Lens and Dark Slide are hidden in the Camera). Price, with 3 Double Backs, Taylor, Taylor & Hobson's D Lens, working *f*/5.6, Iris Diaphragm, and Rack and Pinion ... £12 18 4
With 1 Slide ... 11 13 4

C.C.C. The "Reflex" Detective Camera, 5 x 4in. Price, with 3 Double Backs, Taylor, Taylor & Hobson's D Lens, working *f*/8, Iris Diaphragm and Rack and Pinion ... £13 15 0
With 1 Slide ... 12 10 0

L.P. The "Reflex" Hand Camera, 3¼ x 3¼in. Price, with 3 Double Dark Slides, R.R. Lens, Stops, and Rack and Pinion ... £6 13 4
With 1 Slide ... 5 16 8

P. The Popular "Reflex" Hand Camera, ¼-plate. Price, without Sides, but with R.R. Lenses, Stops, and Rack and Pinion ... £5 0 0
Tylar's Single Metal Dark Slides to fit this Camera, each ... 0 1 8



This is not a Camera for "button pressers," but for intelligent photographers, who like to see and focus their image up to the last moment before exposure.

MAY BE OBTAINED FROM ALL RESPECTABLE DEALERS,
OR DIRECT FROM

LOMAN & CO.

(90, Damrak), AMSTERDAM.

REFLECTOR CAMERAS.

NOT only is the view seen exactly as it ought to appear on the plate—I say "ought," because we all know whatever the camera used may be, that the scene on the ground glass is not always reproduced on the plate—but further, that the trouble of judging distance is obviated. That is to say, we can alter the focal distance between the plate and the lens to suit the subject by actual vision, not by mere guesswork For any rapidly moving objects especially those perhaps, whose motion is towards or away from the camera in a straight line, the reflector possesses undoubted advantages. And not only because our guessing powers may be at fault, but there may not be the necessary time to accomplish the requisite mechanical movement. With a reflector principle we can not only watch the scene or object itself, but can ensure correct focussing at any moment. By correct focussing I do not intend to convey the idea of absolute or microscopical sharpness, but rather that of the exact focus desired. I mean the obtaining of our desires in that direction, the power of ensuring negatives that meet with our own approval. The small finders that are so universally fitted to the ordinary cameras merely serve to indicate position; they render no further help whatever.

Reflectors are of two kinds, but each possessing features of attraction. The first and simplest is that of the twin lens principle, in which two lenses of exactly the same focal length are used. One serves in the ordinary way for a plate, whilst the other sheds its rays, the right way up by means of a mirror, upon the screen. The other pattern is that in which only one lens is used, which in turn serves both ends. This is accomplished by a rapid movement of the mirror just before exposure. The advantage of the latter is first, that only one lens is required, with the consequent decrease in cost, and that the image on the screen or finder more closely indicates the impression upon the plate. Only one lens is in use, and whether it possesses any peculiarities, or the aperture be altered, the view upon the ground glass, upon which is staked everything, remains the same.—"The Hand Camera and How to Use it," *Photography*.

Press Opinions.

"PHOTOGRAPHIC ANSWERS."

"Loman's 'Reflex' Camera approaches as nearly as possible our ideal of a hand camera with dark slides."

"PHOTOGRAPHIC NEWS."

"The instruments are worth examination by those who are selecting a hand camera, and they present some features which are theoretically good, and should be of practical value."

"PHOTOGRAPHY" ANNUAL, 1891.

"I have thoroughly tried this camera, and my results were perfectly satisfactory."

"BRITISH JOURNAL OF PHOTOGRAPHY."

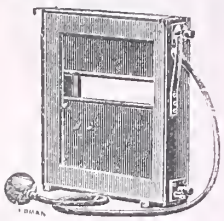
"What is claimed as being special advantages in cameras of this class is the seeing on the ground-glass precisely what is to appear in the picture—no more and no less—and keeping an eye on the picture with the ability of focussing to the last moment. Messrs. Mawson & Swan have shown us a considerable variety of these capital and ingenious Amsterdam cameras in various makes, and of several sizes, the leading idea in all being, however, such as we have here described. The workmanship is excellent."

LOMAN'S PATENT "REFLEX" CAMERAS

May be obtained from all respectable dealers, or direct from

LOMAN & Co. (90, Damrak), AMSTERDAM

LOMAN'S FOCAL PLANE BLIND SHUTTER



(working directly in front of the plate) is the best and quickest shutter on the market. Can be fitted to any Camera.

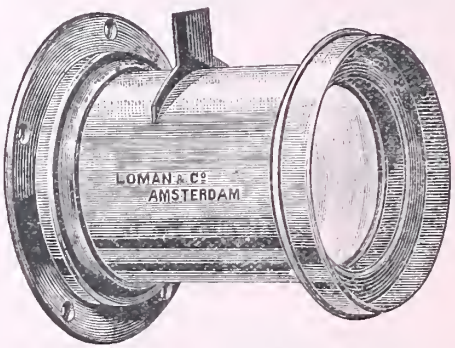
PRICES (including fitting)—

¼	½	7½ × 5	8½ × 6½	10 × 8
£2 1 8	£2 10	£2 10	£2 18 4	£3 10

See also in addition of Holland Cameras, page 1.

LOMAN'S BEST QUALITY LENSES.

RAPID RECTILINEAR



	Brass Mount, Waterhouse Stops.	*Aluminium, Iris Diaphragm.*
¼-plate and 5 × 4	£1 15 0 ..	£2 10 0
½-plate and 7½ × 5	2 0 0 ..	2 15 10
¼-plate and 9 × 7	3 6 8 ..	4 3 2
12 × 10	6 5 0 ..	7 14 2
15 × 12	8 6 8 ..	10 0 0

LOMAN'S WIDE-ANGLE SYMM. LENSES.

4¼ × 3¼	6½ × 4¾	8½ × 6½	12 × 10	15 × 12
£2 1 8	£2 10 0	£3 15 0	£6 5 0	£8 15 0

Angle of view 100°

May be had from all Dealers, or direct from

LOMAN & CO.

(90, DAMRAK), AMSTERDAM.

AMPHLETT, HUMPHREYS & CO.,

88, BRIXTON HILL, LONDON, S.W.,

Photographic Manufacturers, Dealers, and Shippers,

Are the cheapest and best for every description of Photographic

CARD MOUNTS, CARDBOARD, &c.

Also for **Finest Sensitised Papers**, sample sheet, post free, 9d. A trial solicited.

Telegraphic Address: "PHOTOGEN, LONDON."

John J. Atkinson,

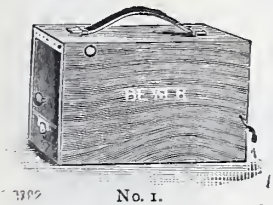
33 & 37, MANCHESTER STREET, LIVERPOOL,

SUPPLIES

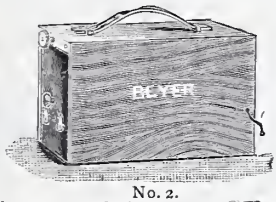
Everything in connection with Photography.

Agent for Carl Zeiss Anastigmatic Lenses, Jena.

BEYER'S MAGAZINE HAND CAMERAS.



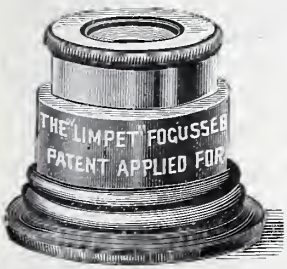
No. 1.



No. 2.

Quarter-plate and Lantern size, **25/-** and **30/-**; with R.R. Lens, **£2.** They are made of mahogany and polished; carry 12 plates, all can be changed in a few seconds by merely turning a knob. The plates cannot stick or get out of order. Lens has fixed aperture, all things being in focus beyond 10 or 12 feet. Shutter can be worked for time or any speed the operator desires.

W. BEYER, 5, Kelly Street, Kentish Town, LONDON, N.W.



FULL SIZE.

THE

'Limpet' Focusser & Finder

WITH ATTACHMENT FOR CAMERA, &c.

Supplied in neat metal case for the pocket.

Price 2s. 6d.; post free, 2s. 9d.

To be had from the Dealers, or the Inventor—

WARWICK BROOKES,

350, Oxford Road, MANCHESTER.

HIGH-CLASS CAMERAS & APPARATUS

AT 50 PER CENT. BELOW USUAL PRICES.

Our ¼-plate **"BOOK" CAMERA** is a sensible novelty.

THE **"MODERN" CAMERA,** with three double slides, all movements, rack adjustment, **£2 17 0,** a marvel of cheapness and quality.

OTHER CAMERAS EQUALLY CHEAP. ILLUSTRATED CATALOGUE FREE.

J. BRAINE & SONS,

22, BEDFORD TERRACE, MORAY ROAD, HOLLOWAY, LONDON, N.

THE ECLIPSE CHANGING BAG.

(REGISTERED.)

SIMPLE. PORTABLE. RELIABLE.

QUITE SAFE FOR ISOCHROMATIC OR RAPID PLATES OR FILMS.

A NEW PATTERN now ready, fitted with light-tight pockets for exposed and unexposed plates or films.

This entirely obviates the necessity for carrying a multiplicity of envelopes or plate boxes.

PRICES: (without pockets) ¼ pl. size, **5/-**; ½ pl. **7/6**; ¼ pl. **10/-**
(with pockets) all sizes, **2/6** per bag extra.

F. BERESFORD, 14, Bridge Road West, Battersea, **LONDON, S.W.**

AGENTS: Adams & Co., 81, Aldersgate St., E.C., and 26, Charing Cross Road, W.C.

◆ EDWARD DAY ◆

(Established 1857),

Refiner, Assayer & Bullion Dealer,

HAVING a Superior Method of REDUCING every kind of GOLD and SILVER WASTE from Photographic operations, is thereby enabled to give a High Price for the same. *Cash per return of post.*

28, WARSTONE LANE, BIRMINGHAM.

FITCH'S SPECIALITIES.

CELLULOID FILMS OF EVERY DESCRIPTION FOR PHOTO WORK. FOCUSSING SCREENS, &c.

CELLULOID FILMS, the Original.
NEGATIVE FILMS, the Best.
POSITIVE FILMS, the Cheapest.

Admitted to be the only perfect and reliable Films in the Market.—*Vide* Testimonials.

OF ALL DEALERS and

E. H. FITCH, 34, ANGELL RD., BRIXTON, LONDON, S.W.

PRICE LISTS POST FREE.

JAMES HENDERSON,

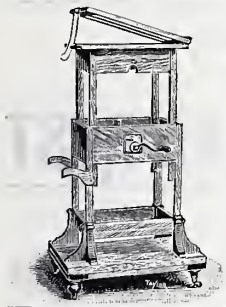
13, Crown St.,

ABERDEEN

DARK ROOM FOR USE OF CUSTOMERS

Supplies all Requisites used in Photography.

LARGEST DEALER IN THE NORTH.



THE 'RIGID' STUDIO STAND.

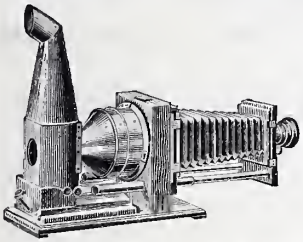
The only Stand on the Market giving extreme rigidity with great height. Descriptive Circular, also Catalogue of general photographic requirements and list of second-hand goods (a large stock of which are always on hand), on receipt of stamp.

HARRY GRAYSON, General Photographic Dealer,

11, *New Market Street*, *BLACKBURN.*

TELEGRAMS:—"GRAYSON, BLACKBURN."

HUME'S CANTILEVER ENLARGING APPARATUS



Improved Patterns. Correct Optical Principles. Accurate Mechanical Centring.

Full Aperture Condensers without Objective—5½in. £4 15s.; 8¼in., £8 10s.; 9in., £10 10s.; 10in., £12 12s. 11in., £15 15s. With Enlarging Objective—5½in., £6 10s. 8¼in., £11 15s.; 9in., £16 10s.; 10in., £19 7s.; 11in. £22 10s. Folding Rails—5½in., 10/-; 8¼in., 14/-; 9in., £1; 10in., £1; 11in., £1 3s. Stage Admits—5½in., 8½ x 6½; 8¾in., 10 x 8; 9in., 12 x 10; 10in., 14 x 11; 11in., 15 x 12

Illustrated Descriptive Pamphlet post free.

DESIGNED AND MANUFACTURED BY

WILLIAM HUME,

3, Lothian Street, EDINBURGH.

HOLMES & WATSON,

PHOTOGRAPHIC MANUFACTURERS FOR THE TRADE.

STEAM WORKS:

35, DANBURY STREET, ISLINGTON.

PLATINOTYPE PRINTING

CAREFULLY EXECUTED

FROM PHOTOGRAPHERS' OWN NEGATIVES

BY

RICHARD KEENE, Derby.

THE FIFTH EDITION OF THE

OUTDOOR PHOTOGRAPHIC NOTE-BOOK, post free for 13 stamps,

From R. KEENE, Photographic Dealer, DERBY.

HARRISON'S

PHOTOGRAPHIC HEAD REST

MANUFACTORY:

LEEDS, ENGLAND.

HANNAM & COMPANY,

25, Soho Square, LONDON, W. | Atlas Works, GAINSBOROUGH.

PHOTOGRAPHIC & FANCY CARD MAKERS & CARDBOARD MANUFACTURERS,

MANUFACTURERS OF

The GAINSBOROUGH Reg. Mount.
The PRINCESS Reg. Mount.
The NAVAL Reg. Mount.
The ATLAS Reg. Mount.
The CAMBRIDGE Reg. Mount.
The WHATMAN Mount.

ALSO ORDINARY PHOTOGRAPHIC CARDS OF EVERY DESCRIPTION.

Our new Catalogue will be published in May, giving full particulars and prices of our

ARTISTIC MOUNTS.

OUR GOODS MAY BE HAD THROUGH ANY PHOTO. CHEMIST OR DIRECT FROM US.

JUST PUBLISHED.

THE FIRST PRINCIPLES OF PHOTOGRAPHY

By CLEMENT J. LEAPER, F.C.S.,

Author of "Materia Photographica," etc.

ILLUSTRATED. CLOTH BOUND. PRICE 5s., POST FREE 5s. 4½d.

London: ILIFFE & SON, 3, ST. BRIDE STREET, E.C.

THE CELEBRATED "NYS" DRY PLATES.

RAPID. UNIFORM. CLEAN.

Best and cheapest Dry Plates in the market. Unequalled for the Studio and all instantaneous pictures.

Sizes ..	$4\frac{1}{4}\times3\frac{1}{4}$	5×4	$6\frac{1}{2}\times4\frac{1}{4}$	$6\frac{1}{2}\times4\frac{3}{4}$	$7\frac{1}{2}\times5$	8×5
Doz. ..	1/-	1/9	2/-	2/3	3/-	3/6
Sizes ..	$8\frac{1}{2}\times6\frac{1}{2}$	10×8	12×10	14×11	15×12	17×14
Doz. ..	4/6	7/-	10/9	13/9	18/-	22/6

Sole Agent: WALTER H. THOMPSON, The London & Paris Optic & Clock Co., 24, Edmund Place, Aldersgate Street, LONDON, E.C.

A SPECIALITY!

THE MANCHESTER PHOTOGRAPHIC DEPOT,

71, OXFORD STREET,

Has the Largest STOCK of

SECOND-HAND CAMERAS,

LENSES AND SUNDRY PHOTOGRAPHIC GOODS OUT OF LONDON.

Send particulars of what you require or wish to Sell. Prompt attention to Correspondence.

CATALOGUES POST FREE.

ROBERT C. MURRAY,

PHOTOGRAPHIC STORES,

8, GARRICK ST., COVENT GARDEN, W.C.

CAMERAS, LENSES, OUTFITS, CHEMICALS AND MATERIALS.

SPECIAL AGENCY FOR THE

Celebrated "NYS" Dry Plates & Tylar's Novelties.

NEW CATALOGUE AND PRICE LISTS POST FREE.

ALL GOODS AT LOWEST CASH PRICES.

NELSON'S PHOTOGRAPHIC GELATINE

AND

Nelson's Special X Opaque Gelatine.

The Best for Dry Plate and other work.

Retail from all Dealers in Photographic Materials; wholesale from the Manufacturers--

GEORGE NELSON, DALE & CO., LTD.,

14, DOWGATE HILL, LONDON, E.C.

ENAMELLING in the same UNEQUALLED STYLE as heretofore.

OLDEST ESTABLISHED FIRM IN ENGLAND.

Also Tinting, Printing, Toning, Mounting, etc.

ALBUMENISED AND TISSUE PAPERS.

Importers of the celebrated LION BRAND ALBUMENISED PAPER, £5 15s. per ream; sample quire, 6/9, postage 4½d.

Inventors of the new BURNT-IN PHOTOGRAPHIC PROCESS on Glass, Porcelain, etc.

OEFFELEIN & CO., 54, Berners Street, LONDON, W.

Perry's Cloud Negatives.

CARBON varnished Films on Celluloid, printable from either side and permanent. From all dealers or the maker. 19 years in the market; hundreds of testimonials.

For ½-plate, 1/6; ¼-plate, 2/-; 10x8, 3/-; 12x10, 4/-; 15x12, 5/- each.

CARBON VIGNETTERS.

¼-plate, 9/-; ½-plate, 15/- per doz. Any shape to order.

W. PERRY, Photographer, Folkestone.

SCORER'S

PATENT CAMERA AND TRIPOD STAND.

Improved Cameras of novel and ingenious make, possessing advantages over every other form of portable camera.

The Tripod Stand is the most rigid and easily managed stand of any yet invented.

Catalogue, with full description and illustrations, entitled "MY CAMERA, AND HOW TO USE IT," post free Six Stamps. Price List only free. SOLE ADDRESS—

W SCORER, Photographic Apparatus Manufacturer, **NORTH STREET, HAVANT.**

Also Dealer and Maker of Photographic Cabinet Work, Chemicals, and Sundries.

SPECIALIST IN HAND CAMERAS.

W. G. ROBERTS, Camera Maker, Leytonstone, London, E.

My '92 Hand Camera is the best made and cheapest instrument ever put on the market. Special Hand Cameras made to order, and advic given upon all Camera Work.

IMPORTANT NOTICE

FOR DEALERS AND PHOTOGRAPHERS.

THE BEST AND CHEAPEST PHOTOGRAPHIC CARDS,

Printed and Without Printing, to be obtained in the first Austrian Photographic Mounts Steam Manufactory of

BERNHARD WACHTL, VIENNA VII. KIRCHBERGGASSE, 37.

Also the following Specialities:

Dry Plates, Albumenised Paper, Aristo Paper, Celloidin Paper, Painted Backgrounds, Accessories in Wood and Papier-Mache, Cameras, Burnishers, Trays in Porcelain and Papier Mache, Cut-out Mounts, Stcphanie Vignettes, &c.

TRAPP'S
ALBUMENIZED PAPERS.

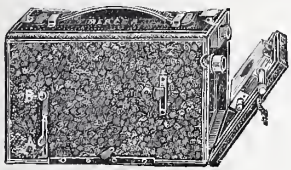
ONLY Prize Medal at the Vienna International Exhibition, 1873.
Prize Medal, Philadelphia Exhibition, 1876.

Print and Tone quickly, yielding the Richest Tones and Purest White, without Blisters or Cracks.

SPECIALTY.—NEW Improved DOUBLE-ALBUMENIZED PAPER in Permanent Rose Colour, free from smell.

L. TRAPP & Co., 1, Budge Row, Cannon St., **LONDON, E.C.**

The "ALERT"
AUTOMATIC MAGAZINE HAND CAMERA.

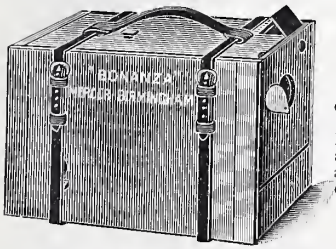


HOLDS twelve ¼-plates; measures 10×7×5 inches outside; has R.R. Lens, Roller-blind Shutter, and sunk Finder; only two movements; plates always in position for exposure; very simple and thoroughly reliable; made of well-seasoned mahogany, covered in good leather.

PRICE £3 10s.

Write for full descriptive List.

R. & A. J. MERCER, 16, King Street, SPARKBROOK, BIRMINGHAM.



THE "BONANZA"
Automatic Magazine Hand Camera.

THIS Camera holds twelve ¼-plates; outside dimensions, 10½×7½×5¾ inches; fitted with 5×4 R.R. Lens, working at f/8; adjustable Roller-blind Shutter and recessed Finder. Changing is simple, expeditious, and reliable. Made of well-seasoned mahogany, neatly covered in good leather. Is compact, neat and portable.

PRICE £3 3s.

FULL DESCRIPTIVE LIST ON APPLICATION.

R. & A. J. MERCER, 16, King Street, SPARKBROOK, BIRMINGHAM.

GOLD MEDAL INTERNATIONAL INVENTIONS EXHIBITION.

Photo-Zincography.

Photo-Lithography.

Photo-Mechanical Printing.

WATERLOW AND SONS

LIMITED,

Photographic Art Printers & Engravers,

FINSBURY WORKS, LONDON, E.C.

Collotype.—Hand and Machine Printing for Art Publications, Scientific and Antiquarian Periodicals, Machinery, Landscapes, Portraits, Pottery, Furniture Designs, Trade Advertisements, &c. The superior results given by this process, and the rapidity and cheapness by which the prints are produced, together with the advantage of printing with or without margins, place it in the first rank of processes for commercial purposes.

Messrs. Waterlow and Sons, Limited, have given this branch of the Photo-printing Department special facilities for the production of good work, and have introduced the most perfect machinery and plant obtainable.

WATERLOW & SONS, LTD., FINSBURY WORKS, E.C.

GOLD MEDAL INTERNATIONAL INVENTIONS EXHIBITION.

Woodbury Prints.—High-class permanent copies, equal in appearance to the best Silver Prints, of Portraits, Landscapes, Furniture, Pottery, &c. Prints may be obtained in almost any colour from Customers' own Negatives, or from the original objects. These reproductions are specially suitable for Portrait work, and are valuable for every description of Artistic or Commercial Illustrations.

Photo-Zinco Engraving.—Blocks for Surface Printing, from Line and Grained-paper Drawings, Steel and Copper Plates, Wood Engravings, &c., &c. *Speciality*—Letterpress Blocks in Half-tint Engraved on Copper direct from Photographs from Nature, Wash Drawings, Paintings, &c.

Accurately registered Blocks for Chromographic Printing. Intaglio Engraving in Line and Half-tone on Copper and Zinc.

The greatest care and skill is employed in the production of these Blocks, and the results are the finest which it is possible to obtain.

The new and extensive Photographic Works being fitted with Modern Appliances, Machinery, Electric Lighting, &c., rapid and accurate work is always obtainable, irrespective of weather or season.

PRICE LISTS, ESTIMATES and full particulars on application.

WATERLOW & SONS, LTD., FINSBURY WORKS, E.C.

McGhie & Co.'s
1892 CATALOGUE

IN consequence of the great expense entailed in the production of this Catalogue we are reluctantly compelled to make a nominal charge—a mere fraction of the cost—viz.:

6d., OR POST FREE TO ANY ADDRESS 9d.

EVERYONE INTERESTED IN PHOTOGRAPHY SHOULD HAVE A COPY.

This is the most complete, comprehensive, and concise Photographic List yet published.

It contains nearly 400 Illustrations of everything "Up to Date."

EXCERPTS FROM PRESS OPINIONS.

"**Messrs. McGhie & Co.'s 1892 Catalogue** contains illustrations and price lists of nearly everything under the sun of a modern character in connection with photographic apparatus, &c. It is a useful book, and should be obtained by all interested."—*Photography.*

"As the best got up Catalogue of those now before us, we select that of **Messrs. McGhie and Co.,** for the first place. It contains 160 pages of well selected, copiously illustrated, and nicely printed matter, in the form of descriptions of lenses, cameras, and apparatus in general."—*British Journal of Photography.*

"Each year it grows bigger, more complete, and more useful, and has an enormous number of illustrations of the very latest novelties in apparatus and accessories."—*Amateur Photographer.*

"The best catalogue yet issued this season is that of **Messrs. McGhie & Co.,** 75, St. Vincent Street, Glasgow. It consists of 160 pages, profusely illustrated, and well printed, and even as a work of reference, would have considerable value. A detailed examination of its pages reveals the fact that the goods quoted therein have been most carefully selected. The latest improvements and novelties are included, and revisions of prices have been made."—*The Practical Photographer.*

"**McGhie & Co.'s 1892 Catalogue** is a most comprehensive volume, and is a ready reference book for information concerning every piece of apparatus used in photography. In addition, we find in it descriptions of various photographic preparations, and a mass of useful formulæ. It forms, indeed, a valuable handbook for every-day use."—*Photographic News.*

McGHIE & CO.,

75, ST. VINCENT STREET, GLASGOW.

THE

Graphotone Company

MIDDLESEX,

PHOTO MECHANICAL PRINTERS

THIS Company undertakes the reproduction in Monochrome of oil and water colour Paintings, Drawings, Sketches, Photographs of all kinds, etc., etc.

Graphotone Prints

of Works of Art, Architectural, Engineering, Shipping, and other Trade Subjects a speciality.

The Graphotone Process

is eminently suitable for illustrative requirements of all kinds—from a trade catalogue to the reproduction of an artist's sketch—where accurate representation, perfection of detail and gradation of tone are required.

Specimens

of the Company's reproductions will be found in the pages of this Annual.

Specimens

of other classes of Work and Prices may be obtained on application, which should be accompanied by full particulars of requirements.

J. R. GOTZ, 19, Buckingham St., Strand, LONDON.

SOLE IMPORTER AND CONSIGNEE OF

Obernetter GELATINO-CHLORIDE Emulsion Paper.

The **Premier** *of all* **Printing Papers,** *yielding* **Permanent** *Results.*

O.P. Gel. NEGATIVE FILMS.

ORTHO-CHROMATIC AND ORDINARY EMULSION. APPLICABLE TO ANY DARK SLIDE BY

Gotz's NEW IMPROVED Film Carrier.

—OBERNETTER—

ORTHOCHROMATIC PLATES.

PRINTING-OUT OPALS IN GELATINO-CHLORIDE.

Printing-out Transparencies

ALL CURRENT SIZES.

Gelatino-chloride FOR DEVELOPMENT. *Lantern Plates*

FROM ALL DEALERS IN U.K., or DIRECT FROM ABOVE ADDRESS.

J. R. GOTZ,

19, BUCKINGHAM STREET, STRAND, LONDON.

SPECIALITIES FOR THE SEASON OF 1892.

GOTZ'S IMPROVED CAMERA

With ALUMINIUM FITTINGS, ATLAS TRIPOD, and CHANGING BOX for FILMS,

Makes the most Perfect Outfit for the Field for the **Amateur** as well as the **Professional** Photographer.

GOTZ'S "STEREO" HAND CAMERA

FOR TWO QUARTER-PLATES—STEREOSCOPIC, SEPARATE EXPOSURES,

Will shortly be placed on the market.

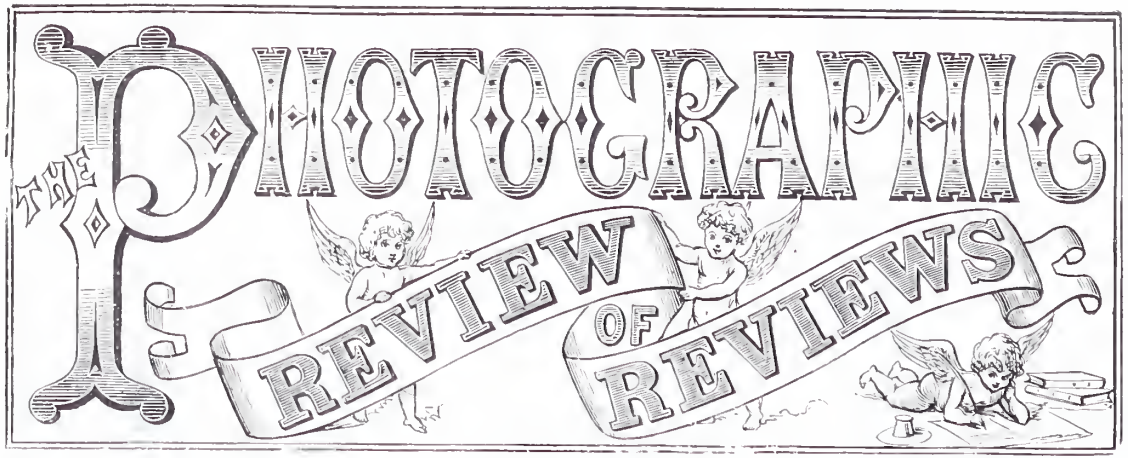
GOTZ MAGAZINE HAND CAMERA "SPHINX."

With **REPEAT SHUTTER,** always ready for $\frac{1}{4}$-plate or 5×4 sizes.

GOTZ'S FILM CARRIERS

TRADE **KANGARU.** MARK.

BEST YET INVENTED (OF ALL DEALERS IN U.K.)



Monthly

Price

6D.

EDITED BY WALTER D. WELFORD.

Profusely Illustrated

BY PHOTOGRAVURE, COLLOTYPE, AND OTHER PROCESSES.

A Synopsis of the Current Photographic Literature of the World.

EDITORIAL ADDRESS - - - - - - - 47, Hagley Road, Birmingham.
PUBLISHERS - - - - ILIFFE & SON, 3, St. Bride Street, London, E.C.

Extracts from Press Opinions.

Photography.

It strikes out on absolutely new lines. The printing and get-up of the new magazine are certainly attractive, and its style and character equally so.

Magic Lantern Journal.

To a large extent the general "get-up" reminds one of the style of American photographic journals.

Photographer's Indispensable Monthly.

Far and away the smartest thing that has been attempted in photographic journalism, and is, I hear, a decided success. The whole "get-up" of the magazine is excellent, and its illustrations, type, paper and style are simply delightful.

The Optician.

It bears every sign of continued vitality, and bids fair to become the aristocrat of the photographic press.

British Journal of Photography.

The new venture of Mr. Walter D. Welford reflects credit upon him for its neat *ensemble*.

St. Louis and Canadian Photographer.

It is ably edited and gotten up, and is withal superior in appearance to most of our foreign exchanges.

The Beacon, U.S.A.

Makes a good beginning, and will, we venture to predict, very creditably fill a long vacant niche.

Wilson's Photographic Magazine.

Presents much information in a concise but attractive manner, and is admirably illustrated.

Anthony's Photographic Bulletin.

Printed in a very artistic manner, on nice paper.

American Journal of Photography.

Certainly ahead of anything we have thus far seen in a British Magazine.

Canadian Photographic Journal.

A very acceptable addition to our photo literature.

Detroit Free Press.

The handsomest photo publication we have seen.

FEATURES.

LEADERS upon everyday subjects.
ARTICLES of the MONTH reviewed.
GENERAL PRESS on Photography.
PERSONAL ITEMS. (Illustrated).
SOCIETY WORK of the MONTH.
HAND CAMERA WORK (Illustrated).
PUBLIC FUNCTIONS of the MONTH. (with portraits).
NOVELTIES of the MONTH.
BOOKS of the MONTH.
REVIEW of the MONTH.
INDEX to LITERATURE.

&c., &c., &c.

SAMPLE COPY

Post free to any part of the world.

England.	U.S. America.	Fran	
8d.	17 cents.	84 cen.	69 pfen.

TO THE PHOTOGRAPHIC TRADE.

MESSRS. ILIFFE & SON

RESPECTFULLY beg to intimate to the photographic trade that they are prepared to execute at the shortest notice, in the best style, and at the same time at moderate and reasonable rates,

Printing of all Descriptions

Their works are supplied with the latest and most approved machinery and type, and nothing but best work is sent out from them. They have great experience in, and especial facilities for, the production of TRADE CATALOGUES, PRICE LISTS, PAMPHLETS, and BOOKS, and will have pleasure in submitting samples and prices upon application.

ILIFFE & SON, "THE CYCLIST" PRINTING WORKS, COVENTRY

LONDON: 3, ST. BRIDE STREET, E.C.

Dark Slides

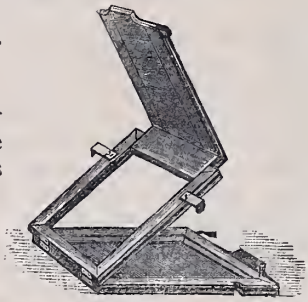
Best Quality. Fitted to any Camera.

Light-tight, and correct fit guaranteed.

¼-plate, 5/-; ½, 9/3; ¼, 13/-

All sizes made. A reduction for three. Sample sent on receipt of value and postage. Slides to fit Lancaster's and other Cameras in stock.

Over 15,000 have been already sold.



NEW CHANGING BACK

Holding 12 Quarter Plates. Fitted to any Camera.

Price 30/- *Occupies same space as three slides.*

COMPETITION DEFIED!

The Toifel Hand Camera

25/-

Made of solid Mahogany, ebonized or polished, new self-setting Time and Instantaneous Shutter, Rapid lens, finder, and holds 12 quarter plates, instantaneous change.

Price complete, 25/-

Please Note—This is not a cardboard camera.

Our New Price List with supplement should be seen by all who contemplate purchasing apparatus. Sent free on application.

TALBOT & EAMER,

7, 9 & 11, Exchange Street, Blackburn.

Telegraphic Address: "EAMER, BLACKBURN."

The Tendency

OF the present time is to replace mental and bodily exertion by some mechanical equivalent, as instanced by the labour-saving devices of modern industries. Anyone who wishes to get on nowadays must save his time and labour; yet, in photographic matters, these principles seem to be ignored. There are no cameras, with one exception, which may be said to be "up to date" in this respect. Many persons have recently introduced new hand cameras, some with no pretension to perfection, pretending to *give* something "cheap," and offering a sovereign's worth for ten shillings. Cameras of this kind do very well for the nursery or scientific children. Others have confined themselves to the invention of some new plate-changing arrangement, wonderful in its uncertainty, and presenting no advantages over existing contrivances. It must be borne in mind that a modification is *not* necessarily an improvement.

Many of these cameras are as portly as a portmanteau, or as bulky as a bacon box, and what a treat it is to change a plate with one of these; it's as heavy as a baby, and you shake it until you are red in the face—with no other effect.

Some of us have heard the story of the hand-camera excursion of a certain society. "Where's Brown, I haven't seem him lately?" "Oh, he's got one of So-and-so's new hand cameras, he's down by the river trying with the help of a stone to change a plate; can't you hear him? I don't think he will have many 'whole' plates in his 'quarter' camera by the time he gets home."

Cameras of this kind are not *very* satisfactory; what is wanted is something to save time and trouble. With some ingenious cameras you turn a knob or press a button, and it *should* change the plate, but it doesn't, which is often productive of bad thoughts, if not words; then, if the plate *does* happen to change, you have to "fiddle" with the shutter, and possibly have to close the aperture of the lens before doing even this. Here's another type. "First turn the camera over and pull out a rod, and do something else," and all this must be done carefully and slowly, and with method; possibly some person passing accidentally jolts your elbow and spoils the whole thing. Then the shutter has to be set, and so on. Now there is nothing very perfect or practical about all this. Each operation takes time, and is, in fact, no better than the old system of dark slides, yet some people adhere to these for hand-camera work. Now almost anybody can construct a box, put in a few dark slides, and call it a hand camera; it may be economical, if Talbot and Eamer's dark slides be used, but it is *not* practical.

With the new **"Talmer"** hand camera, all that has to be done is to change the plate, one operation, which also *sets the shutter*. The more things to do, the easier to forget—please remember that. If you have to go to six shops for the wife, you'll forget the penny packet of needles, but if the number be reduced to five, or less, the probability is you won't, and peace will continue to reign in the domiciliary residential abode, that might otherwise be disturbed. So with hand-camera movements, there is nothing to gain by having a lot to do, because, after all, the result pertains to the lens, or your use of it with artistic perception, not to movement of this lever or the other knob. And if you forget, the case will probably be one of a spoilt plate.

Here's an instance. You may be about to make an exposure, and all at once the thought strikes you, "Did I change that last plate I exposed?" The more you think about it, the deeper your perplexity; here is an awkward predicament; you have either to risk spoiling what, if already exposed, might have been a nice picture, or you may decide to change the plate, and possibly find on development that it has never been used. In either case a plate is wasted. If you use a **"Talmer"** all this sort of nonsense is avoided. It is a common-sense instrument, constructed on proper mechanical principles; you *can't make an exposure* unless you have changed the last plate—in fact, the shutter won't "go off." Furthermore, the indicator tells you whether or not the last plate was changed, and whether it was exposed or not. How annoying it is to find, on endeavouring to secure a "shot," one which, perhaps, you particularly wished for, that the shutter hasn't gone off. Why? Simply because, after bothering with the complicated movements of changing the plate, be it with dark slides or otherwise, you omitted to set the shutter.

A most important point in a hand camera is a good finder, or rather two of them, and to be of any *use* they should be of decent size. Everyone has seen the ridiculous bits of ground-glass fitted in some high-class, high-priced instruments, half-an-inch square being common, whilst one or two makers are rather more liberal, and make a show of being even extravagant by the adoption of finders an inch square or so, and having no sort of proportion or relation to the lens in the camera. The finders in the **"Talmer"** are about quarter the area of the plate used, and give a picture identical with the lens; they are protected by hoods, and give a clear, sharp image.

The changing arrangement of the **"Talmer"** is absolutely certain in action, and must not be confused with the bag changing adopted by other makers. The bag is of entirely novel construction, the plate touches nowhere except the top, the sides fall away and do not entangle the plate, and should be seen to be thoroughly appreciated.

Please remember that the **"Talmer"** Cameras have *all* the advantages and features possessed by any other instrument, and have other special conveniences which cannot be obtained with any other camera. The workmanship is of the very best throughout; there is no rubber or perishable material used in their construction. The prices and fullest particulars will be found in a 16-page pamphlet, which ll be sent on receipt of stamp.

Specimens of work can be had, 3d. each, from

TALBOT & EAMER,

7, 9 & 11, EXCHANGE STREET,

BLACKBURN.

THE

NEW COMBINATION CAMERA.

A PERFECT Hand and Stand Camera, takes any lens from 4 to 10 inches focus, has *rising front*, *swing back*, roller blind, time and instantaneous shutter working behind lens; can be used with roll-holder, slides, cut films, or plate chamber; has finder for vertical or horizontal pictures, and can be used on a stand with focussing screen, just like an ordinary camera.

PRICE AND FULLEST PARTICULARS ON APPLICATION.

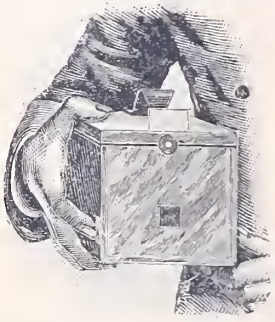
SHEATHS

As used in "Talmer" Hand Camera. These are absolutely uniform in size and thickness, and are made of thin oxidized sheet steel, holding plates of any thickness up to register; they are not coated with any pigment, which only wears off, causing dust and pinholes. Having put down special machines for their manufacture we can supply at following prices:—

¼-plate, 5/6 per dozen; 5 × 4, 10/- per dozen. Postage extra.

SAMPLE SENT FOR VALUE AND POSTAGE.

THE NEW TALMERS, 1892,



Can now be had in five varieties. No. 1 single combination lens, **£3 15s.**; No. 2 R. Rectilinear, fixed focus, **£4 17s. 6d.**; No. 3 Euryscope, *f*/6 lens, **£6 10s.**; No. 4, 5 × 4 size, Euryscope lens, **£8**; No. 6, ½-plate size, Euryscope lens, **£9 5s.** The mechanical arrangement of these instruments place them far ahead of any other camera, whilst their optical qualities cannot be surpassed.

FULL PARTICULARS AND ILLUSTRATED PAMPHLET SENT ON RECEIPT OF STAMP.

TALBOT & EAMER, 7, 9 & 11, EXCHANGE ST., BLACKBURN.

DAVENPORT & CO.,

PHOTOGRAPHIC MANUFACTURERS

AND DARK-ROOM SPECIALISTS,

32, Parkhouse Street, Camberwell, S.E.

Manufacturers of the following Dark-rooms, &c.:—

"THE EVEREADY," "THE NATIONAL," "THE ZEPHYR,"

"THE BOUDOIR," "THE CONICAL," "THE ARMY,"

And many others, ranging in price from 25s. to £10 10s.

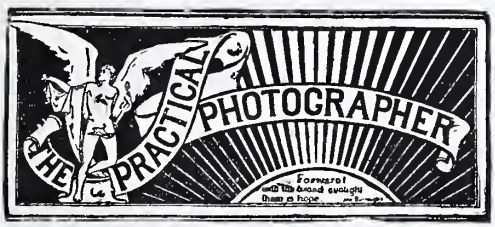
WHOLESALE MANUFACTURERS OF

Cameras, and all Photographic & Optical Lantern Requisites.

LOW QUOTATIONS GIVEN.

Dark-room Catalogue free. Societies' Dark-rooms fitted throughout.

READ



DAGUERRE WOULD HAVE JUMPED

AT THE INFORMATION IT CONTAINS. BECAUSE:—

THE PRACTICAL PHOTOGRAPHER is practical, and genuinely useful to men who are working, not dreaming (at least s say some hundreds of its readers—Amateurs, Professionals, Manufacturers, and Merchants, En lish and Colonial alike, and *they* ought to kr ow).

THE PRACTICAL PHOTOGRAPHER abstracts (and acknowledges) the best matter and illustrations from its contemporaries, giving its readers the product of the best brains in the wor d.

THE PRACTICAL PHOTOGRAPHER is more profusely illustrated than any other photographic magazine. The **supplement illustrations**, which are given **every** month, should have a potent i fluence upon the art education of photographers.

THE PRACTICAL PHOTOGRAPHER contains **24** ages, mainly filled with original and helpful matter, and costs only **1 3** oer a nu m for 9 ordinary and 3 double numbers) from a dealer, or post free from the publishers, plate paper, **2 9.**

PERCY LUND & CO., Printers & Publishers, **Bradford & London.**

PLATINOTYPE.

Simplest, most Artistic, and Permanent Photographic Process.

NEW AND IMPROVED PAPER

No Heating of Developer Required.

NO EXTRA COST.

MADE IN THREE QUALITIES { AA—Smooth Paper of medium thickness
BB— do. do. thick, very strong.
CC—Rough Surface Paper, strong.

PRICE 48/- PER QUIRE, 26 x 20 INCHES.

COMPLETE PRICE LIST ON APPLICATION.

These papers will be supplied in **Sealed Tin Tubes,** either in whole sheets (measuring 26 in. x 20 in.), or cut to photographic sizes.

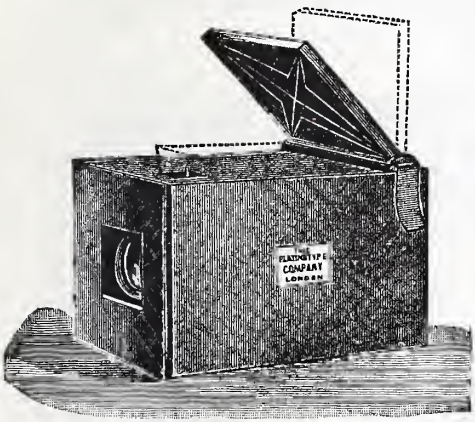
THE PRICES ARE AS FOLLOW:

	Hot-bath Process. Quality A A.	Postage (One Tube)
4½ in. x 3¼ in., 24 pieces in tube ...	1 6 ...	3d. extra.
5 in. x 4 in., ,, ,, ,, ...	2 3 ...	3d. ,,
6½ in. x 4¾ in., ,, ,, ,, ...	3 6 ...	3d. ,,
7½ in. x 5 in., ,, ,, ,, ...	4 6 ...	3d. ,,
Quality A A, BB, CC or S		
8½ in. x 6½ in., 24 pieces in tube ...	6 0 ...	3d. ,,
10 in. x 8 in., ,, ,, ,, ...	8 6 ...	3d. ,,
12 in. x 10 in., 12 ,, ,, ...	6 6 ...	3d. ,,
15 in. x 12 in., ,, ,, ,, ...	9 6 ...	3d. ,,
3 sheets 26 in. x 20 in., in tube ...	6 6 ...	5d. ,,
6 ,, ,, ,, ,, ...	12 6 ...	5d. ,,
12 ,, ,, ,, ,, ...	24 0 ...	6d. ,,
24 ,, ,, ,, ,, ...	48 0 ..	8d. ,,

THE PLATINOTYPE CO., 29, Southampton Row, London, W.C.

IMPROVED

KEY CAMERA.



SIMPLEST AND BEST HAND CAMERA MADE.

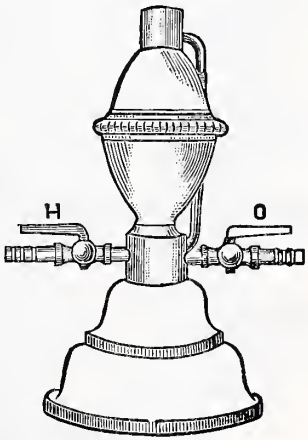
Measures only 8 x 4¾ x 4 ins.

PRICE, Quarter-plate, **£7 7s.** (with 6 Double-key Slides). Ditto, ditto, 2nd quality, **£5** (with 3 ditto ditto)

Used by the best Scientific and Artistic Photographers, including:
CAPTAIN ABNEY, G. DAVISON, F. HOLLYER, R. KEENE, &c., &c.

PLATINOTYPE

Printing Lamp



Platinotype Prints printed by this Lamp in a few seconds.

Price ... ... £2 2s.

MAY BE SEEN AT THE OFFICE OF

THE PLATINOTYPE CO.,

29, Southampton Row, Holborn, London, W.C.

PRICE 1d., free by post 1½d.

Photographic Work:

A CONCISE & COMPLETE RECORD OF ALL PHASES OF PHOTOGRAPHIC ACTIVITY.

Edited by T. BOLAS. F.I.C., F.C.S., &c.

PUBLISHED EVERY FRIDAY.

Photographic Work
Is under the management of proprietors who bring to bear the experience of over a quarter of a century in connection with photographic literature.

Photographic Work
Will meet the needs of the present busy age by giving information concisely, while care will be taken that, though aiming rather at brevity than diffuseness, it will in no way fail to put before its readers details of all phases of photographic progress.

Photographic Work
Will be conducted on lines to meet the wants of Amateurs and Professionals, from the tyro to the expert.

Photographic Work
Will contain Reviews of Books (English and Foreign), Notices of Novelties in Apparatus, Reports upon New Processes, Records of the Proceedings of Photographic Societies, Lists and Abstracts of Photographic Patents, and all news appertaining to Photography, when the subject matter is likely to be interesting or instructive.

Photographic Work
Will give such pictorial illustrations as may be requisite for the better elucidation of the subject matter.

Photographic Work
Will be found an admirable medium for the Announcements of Photographic Dealers, for Employers and Employées, and for all in any way connected with Photography.

Photographic Work
Will be forwarded at the following subscription rates paid in advance:—United Kingdom—Three Months, 1/7; Six Months, 3/2; Twelve Months, 6/4.

All Communications should be forwarded to the Publishers:—

PIPER & CARTER,

Printers, Publishers, and Advertising Agents

5 FURNIVAL STREET, HOLBORN LONDON E.C.

THE OLDEST WEEKLY PHOTOGRAPHIC PAPER.

FOUNDED THIRTY-SIX YEARS AGO.

THE

Photographic News

Edited by T. C. HEPWORTH, F.C.S.

A Weekly Record of the Progress of Photography.

"The Photographic News" circulates in all parts of the world, and is an admirable medium for all announcements in any way associated with Photography.

Attention is also called to the following three works by the Editor of *The Photographic News*:—

Photography for Amateurs.

(CASSELL & CO.)

The Book of the Lantern.

(HAZELL & CO.)

Evening Work for Amateur Photographers.

(HAZELL & CO.)

SHEW'S

GUINEA POCKET CAMERA

WITH THREE DOUBLE BACKS,
FOR PLATES 4¼ x 3¼.

SHEW'S TWO GUINEA MAGAZINE CAMERA.

The Perfection of Simplicity.

No heavy metal sheaths.
No bags.

THE PIONEER OF HAND CAMERAS,

"ECLIPSE,"

SEE THE "ECLIPSE" PAMPHLET.

HIGHEST AWARD PARIS EXHIBITION.

J. F. SHEW & CO., 87 AND 88, NEWMAN STREET, LONDON, W.

SHEW'S

SHEW'S UNIVERSAL Hand Camera

For Lenses of various foci, for Instantaneous or Time Exposures.

SHEW'S NEW INSTANTANEOUS IRIS SHUTTER, &c., &c.

See Special Circulars, free on application.

SHIPPERS AND THE TRADE SUPPLIED.

The Largest Circulation of any Photographic Paper

THE AMATEUR PHOTOGRAPHER

WEEKLY 2d.

The prevailing feature of all articles contributed to the above paper is practical teaching, both elementary and advanced. It forms a

STANDARD GUIDE & FRIEND TO THE AMATEUR,

for whom it is written. Each issue contains—

Leaderettes. Leader. Correspondence.

Practical Articles—

In Art and Science.

Societies' Meetings.

Queries and Answers.

Editorial Advice.

PUBLISHED BY

HAZELL, WATSON & VINEY, Limited,

1, CREED LANE, LUDGATE HILL, E.C.

AMUSEMENT FOR ALL.

PHOTOGRAPHIC PASTIMES

A HANDBOOK FOR AMATEURS.

Containing particulars of many novel and interesting effects to be obtained by the aid of the Camera.

"Under the title of 'Photographic Pastimes' the funny man of the black cloth is shown how to give vent to his humours. He may make martyrs of his dearest friends. He can photo them as donkeys, or sitting knife and fork in hand with their own head in front as a repast. However, to the not too hilarious funny man the book will open up an exceedingly interesting and amusing recreation."—*The Star.*

PROFUSELY ILLUSTRATED.

PRICE 1s.; POST FREE, 1s. 3d.

ILIFFE & SON, 3, St. Bride St., London, E.C.

Materia Photographica

By C. J. LEAPER, F.C.S.

A Treatise on the Manufacture, Uses and Properties of the substances employed in Photography.

A HANDBOOK FOR SCHOOLS AND CLASSES AND FOR PRIVATE USE,

WITH NUMEROUS ILLUSTRATIONS.

PRICE: CLOTH BOUND, 5/-; POST FREE, 5/3.

LONDON: ILIFFE & SON, 3, ST. BRIDE STREET, E.C.

Crown 8vo, 112pp. Illustrated. Sewed, 1s.; post free, 1s. 2d.

Photography for All.

An elementary Text Book and Introduction to the Art of Taking Photographs. By W. JEROME HARRISON, F.G.S., European Editor of "The International Annual of Anthony's Bulletin."

"A rea ly very useful elementary text book upon Photography."—*Amateur Photographer.*

LONDON: ILIFFE & SON, 3, ST. BRIDE STREET, E.C.

PRICE 4s. 6d.; POST FREE 4s. 10d.

THE PROCESSES OF

PURE PHOTOGRAPHY

BY

W. K. BURTON, C.E., & ANDREW PRINGLE.

A Standard Work, Complete in itself, and freely Illustrated.

LONDON: ILIFFE & SON, 3, ST. BRIDE STREET, E.C.

BEAUTIFULLY ILLUSTRATED. PRICE 10s. 6d.; POST FREE 11s.

PRACTICAL

PHOTO-MICROGRAPHY.

BY THE LATEST METHODS.

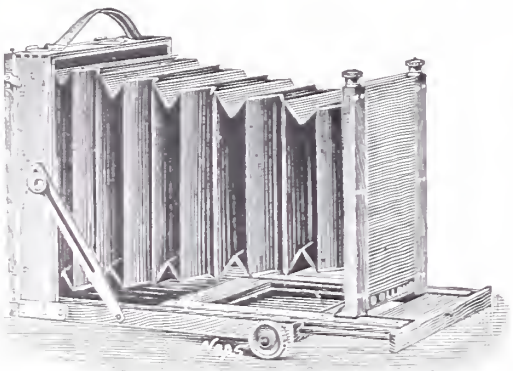
BY ANDREW PRINGLE, F.R.M.S.

To the medical profession this book, partly intended to promote physiological research by photographic methods, is dedicated.

LONDON: ILIFFE & SON, 3, ST. BRIDE STREET, E.C.

DOLLOND & CO.,

35, Ludgate Hill, & 62, Old Broad Street.



DOLLOND'S

'TOURIST'

Photographic Set.

½-plate Long Focus Camera, R.R. Lens, Double Dark Slide, Folding Tripod Stand, and Focussing Cloth.

£4 17s. 6d.

DARK ROOM FOR AMATEURS.

THE

"Duro" Cloth Lantern Slide Bindings.

The best Binders ever offered. Practically Indestructible.

1s. per Gross.

These Binders are also suitable for Stereoscopic and other Transparencies.

AGENT FOR

THE NEW "KODAKS."

The most perfect Hand Cameras ever introduced.

EASTMAN'S FILMS AND BROMIDE PAPERS.

(Send for Price List of same).

DOLLOND'S PURE CHEMICALS, &c.,

FOR PHOTOGRAPHY.

DEVELOPING, PRINTING, ENLARGING, &c.

Lantern Slides made from Negatives.



The Stereoscopic Co

HOLD THE LARGEST STOCK IN ENGLAND OF

KODAKS, SPOOLS & BROMIDE PAPER.

CARBUTT'S WELL-KNOWN FILMS ARE GREATLY REDUCED IN PRICE, and are made in 3 rapidities, viz., INSTANTANEOUS, SLOW & ORTHOCHROMATIC.

Prices per doz., ¼-p., **2/3**; 5 x 4, **3/4**; ½-p., **5/-**; 7½ x 5, **6/3**; ¼-p., **8/9**; 10 x 8, **12/6**; 12 x 10, **19/8**; 15 x 12, **32/6.** They can be sent by post to any part of the world.

ALL THE BEST AMATEURS AND PROFESSIONALS USE THE COMPANY'S **BLACK BAND LENSES & BLACK BAND DRY PLATES.**

THE STEREOSCOPIC CO.'s COMPLETE OUTFITS **PACK INTO THE SMALLEST SPACE POSSIBLE, & ARE OF THE BEST QUALITY OBTAINABLE.**

Send 7 stamps for 200 page Catalogue. Send 15 stamps for the Co.'s A.B.C. of Photography, 23rd Edition (115,000). It is the best Beginner's Guide.

PT.O

The London Stereoscopic & Photographic Co., Ltd.

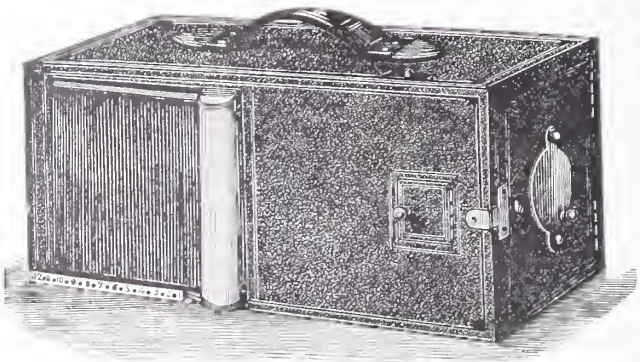
106 & 108, REGENT ST., W., AND 54, CHEAPSIDE, E.C.

The Four Best

THE STEREOSCOPIC CO.'S NEW

"GRAPHIC" HAND CAMERA.

Measures 11 × 5¾ × 4¼.
Holds 12 Plates. No sheaths, no backing, no dark slides.



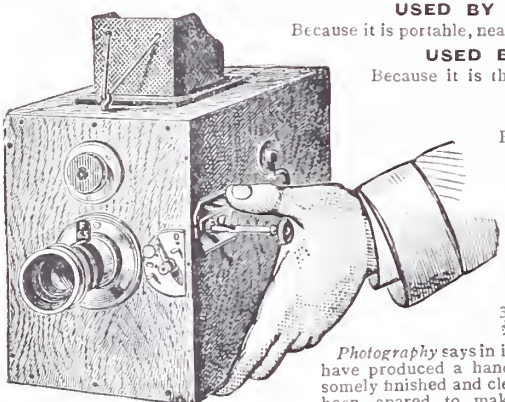
Plates changed automatically without a separate chamber or the troublesome changing bag.

Any plate can he used at will. Plates are locked in a separate cbamber, and cannot be tampered with. Is fitted with a Rapid Rectilinear Lens with revolving diaphragms. Has an excellent finder, and a shutter capable of various speeds; can he fixed upon a stand for time exposures. Weight, loaded with 12 plates, 4lbs. Price, ¼-plate, £7 7s.; 5 × 4, £10 10s.; ½-plate, £12 12s.; ¼-plate, £18 18s.

THE STEREOSCOPIC CO.'S

"ARTIST" HAND CAMERA.

Can be used with Dry Plates. Can be used with Films. Is used in Hot Climates. Is used in Cold. Is used everywhere. Call and see Specimens taken with it.



USED BY AMATEURS,
Because it is portable, neat, self-contained and perfect.

USED BY PROFESSIONALS,
Because it is the only practical Hand Camera ever made.

USED AT HOME,
Because of its capacity for any kind of work, either time or instantaneous.

USED ABROAD,
Because no other Hand Camera can he found with such universal advantages.

It is made in three sizes, ¼-, late 3¼ × 4¼, £10 10s.; 5 × 4in., £12 12s.; ½-pl., 6½ × 4¾in., £15 15s. complete.

Photography says in issue of August 7th: "The company have produced a hand camera pure and simple, handsomely finished and cleverly designed. . . Nothing has been spared to make the 'Artist' hand camera a thoroughly useful one in every respect."

The LONDON STEREOSCOPIC & PHOTOGRAPHIC CO., Ld.,

Hand Cameras.



INSTANTANEOUS PHOTOGRAPHY
MADE EASY BY USING THE

TWIN LENS "ARTIST" HAND CAMERA

(PATENT.)

Used by H R.H. the Princess of Wales and all the principal Officers of H.M. Army and Navy.

The most recent improvement in the construction of the "Artis s'" Hand Camera has eliminated the l st trace of uncertainty from hand-camera work. Without materially increasing the size of the camera a second lens, exactly similar to that used for the production of the picture, is fitted above it, so that the two lenses can be focussed at the same time, the lower lens projecting the view upon the sensitive plate, while the upper one shows an identical picture on a ground glass screen fitted in the top of the camera, thus enabling the user to accurately focus even a moving object after having set the shutter and drawn the slide ready for exposure. This camera can already boast of Royal Patronage and the Company anticipate that their parent "Twin Lens Artist's' Camera" is the favourite of the season.

"H.R.H. The Princess of Wales amuses herself with one of the 'Artist' Cameras of the London Stereoscopic Company, and has had some of the views she has taken transferred to a china tea set. by Mortlock."—Extract from *The Queen*, Feb. 21st, 1891.

PRICE, fitted with Two Euryscope Lenses, working at F/6, **£15 15s.**

CALL AND SEE THE COMPANY'S

£5 5s. Hand Camera

WITH BECK "RECTIGRAPH" LENS.

TO CARRY 40 CUT FILMS.

NO SHEATHS. NO BACKING.

FILMS CHANGE AUTOMATICALLY. INDEX SHOWS NUMBER USED.

It carries Forty Cut Celluloid Films of anybody's make, and can be filled in the dark.

Size of Film $3\frac{1}{4} \times 3\frac{1}{4}$, so that it is invaluable for Lanternists.

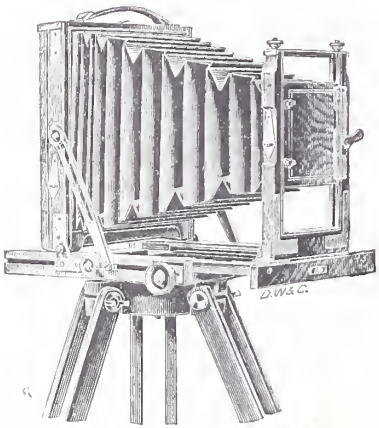
PRICE £5 5s., filled for 40 Exposures.

FULL & FREE INSTRUCTIONS GIVEN TO PURCHASERS.

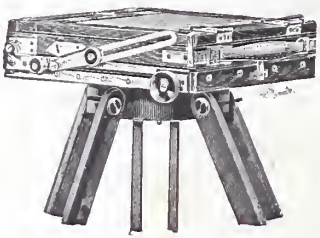
106 & 108, REGENT STREET, W., & 54, CHEAPSIDE, E.C.

GEORGE HOUGHTON & SON'S
SPECIALITIES.

THE "HOLBORN SPECIAL."



OPEN

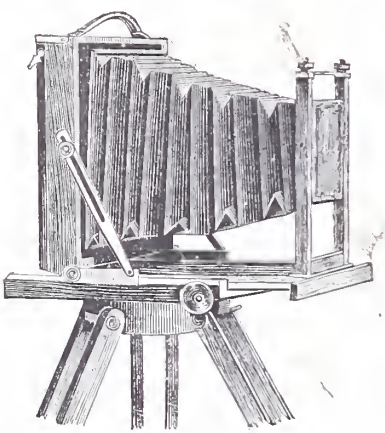


CLOSED

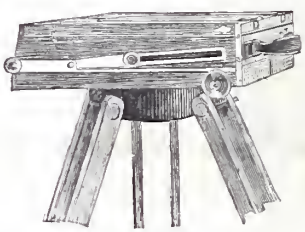
		£	s.	d.
$6\frac{1}{2} \times 4\frac{3}{4}$	Camera and 3 double dark slides ..	9	0	0
$7\frac{1}{2} \times 5$	,,	10	0	0
$8\frac{1}{2} \times 6\frac{1}{2}$	,,	11	0	0
10×8	,,	13	0	0
12×10	,,	15	15	0
15×12	,,	19	10	0

The above is an exceedingly light and rigid camera, of well-seasoned mahogany and best workmanship. All movements are combined, and the shutters of slides are fitted with spring snaps.

THE "HOLBORN."



OPEN



CLOSED

		£	s.	d.
$4\frac{1}{4} \times 3\frac{1}{4}$	Camera and 3 double dark slides ..	4	0	0
5×4	,,	4	0	0
$6\frac{1}{2} \times 4\frac{3}{4}$	,,	4	15	0
$7\frac{1}{2} \times 5$	,,	6	10	0
$8\frac{1}{2} \times 6\frac{1}{2}$	,,	7	10	0
10×8	,,	9	15	0
12×10	,,	12	0	0
15×12	,,	14	0	0

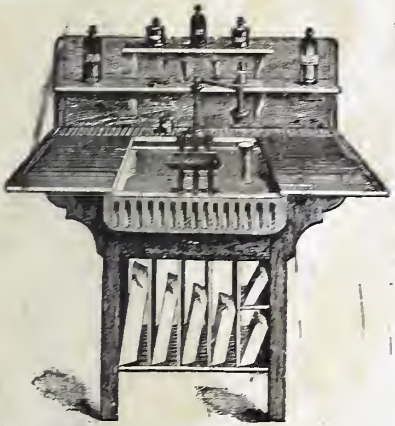
The "Holborn" is constructed on the same principle as the "Holborn Special," and made to meet the requirements of those wishing for a less costly instrument. The difference will be seen by comparing the above blocks.

89, High Holborn, LONDON.

GEORGE HOUGHTON & SONS

SPECIALITIES.

DARK ROOM DEVELOPING SINK.



No. 1, with sink, 24 × 17; extreme width, 4 ft. ... £5 5 0
" 2 " 30 × 19; " " 5 ft. ... 6 10 0
" 3 " 36 × 22; " " 6 ft. ... 7 10 0

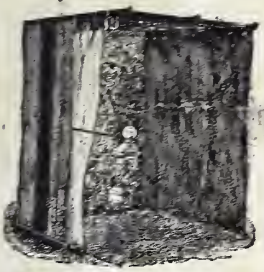
Either of these can be had with Supply Cistern and Connections.

COMBINED DEVELOPING SINK AND DARK ROOM.



No. 1, with sink, 24 × 17, extreme width, 4 ft. ... £9 10 0
" 2 " 30 × 19 " " 5 ft. ... 11 0 0
" 3 " ... 13 0 0

PORTABLE GARDEN OR LAWN STUDIO.



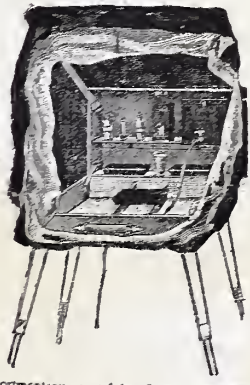
Consists of a light framework in the form of a folding Screen covered with Canvas, with sliding frames to regulate the top light, and fitted with movable projecting Rods, carrying two Side Curtains.

It will also be found very useful for taking portraits in an ordinary room.

Suitable for a Background 7 ft. high by 5 ft. wide, folding into 7 ft. by 2 ft. 6 in. by 7 in., £4 10 0

Paper Background, Graduated, 6 - ; Landscape, 9/-
Do. Mounted on Linen, 8 - extra.

MULTUM IN PARVO DEVELOPING PORTMANTEAU.



Portmanteau, containing Lantern, Washing Trough, Bottles, Measures and Dishes.

For ½ Plate. For ¼ Plate.
£6 0 0 ... £7 10 0

Tripod Stand for ditto extra
1 5 0 ... 1 10 0

89 High Holborn, LONDON.

GETTY CENTER LIBRARY
3 3125 00713 7710